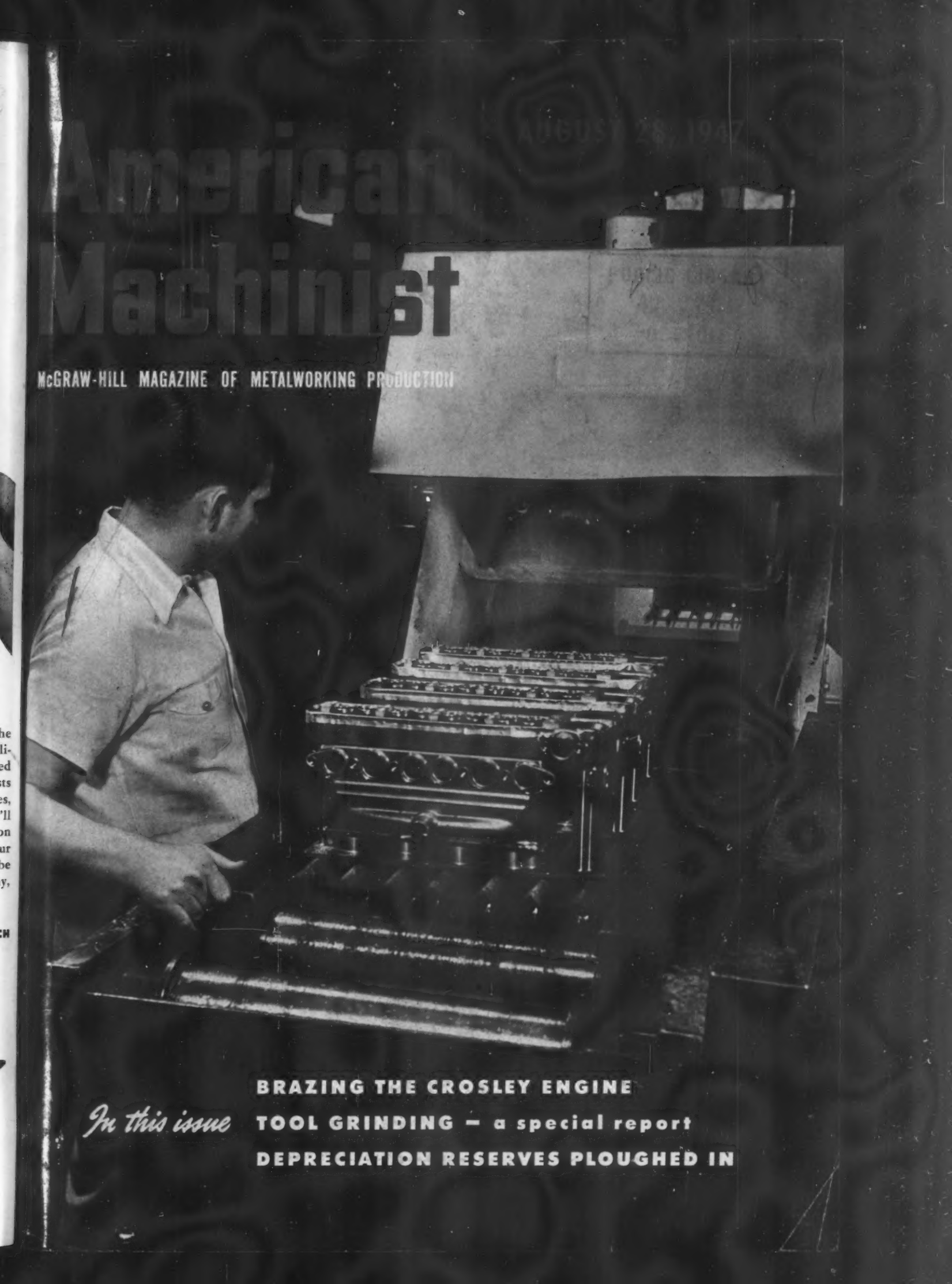
AUGUST 28, 1947

American Machinist

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION



In this issue

BRAZING THE CROSLEY ENGINE

TOOL GRINDING — a special report

DEPRECIATION RESERVES PLOUGHED IN

When is a machine tool *REALLY* expensive?

. . . when you can get another machine to do the same job better, faster, and at lower cos

It's not what a machine costs—it's wh it can *earn* that counts. And that's wh you pay for in a Heald machine—t capacity to actually earn more money to do a specific job better—with few operations and less supervision than predecessor, from the minute it goes work in your shop.

For instance, here's how Heald machin helped one manufacturer increase ear ings—by making his production line mo six times faster! Valve seat inserts ha to be turned, chamfered, and faced both O. D. and sides. Heald enginee figured out how all three operatio could be handled in a single automa cycle . . . with just 15 Heald Bore-Mat replacing the 91 machines previou used. Immediate savings in man ho and equipment totaled 83½%—plus r duced floor space, fewer rejects, le down time.

Results like these show true value as ordinary price tag can. If your oper tions require grinding or borizing of a sort, call in experienced tool engine from Heald's large staff of 200. They c help you find the equipment in your pl that's *really* costing you money—a show you how to replace it *profitab* with precision-built, precision-deliver Heald machines. For further informati write: THE HEALD MACHINE COMPA Worcester 6, Mass.

HEALD

means more precision . . . less cost

INTERNAL AND SURFACE GRINDING MACHINES · BORE-MATIC PRECISION FINISHING MACHINES

TECHNOLOGY DEPARTMENT

American Machinist

MAGAZINE OF METALWORKING PRODUCTION

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Chips & QUIPS

Copper Brazing . . . Ever since the Crosley engine went into production, we have been putting together a story of the manufacturing techniques required for this "sheet-metal powerplant." One thing after another has conspired to delay it, but here it is at last, written by Chester Ricker, Detroit editor and old-time auto man. To celebrate the occasion, we devote our cover to the subject also, the Kodachrome picturing cylinders entering the 2200 F. Lindberg hydrogen furnace for copper-brazing. Cylinders are painted with copper-powder solution, the water jacket slipped into place, thence to this operation. For the whole story (or as much as we are permitted to tell) see our lead article.

Tool Grinding . . . Some 20 pages of this issue are devoted to a very basic special report on Tool Grinding. It introduces several innovations. In the first place, it's our first lengthy report done entirely in pictures, captions, tables and boxes—a method you've repeatedly said you preferred, and one that cuts its length in half and your reading time about three-quarters. Next, Associate Editor Harry Wharen gathered together the basic data, prepared his report—*then* began his field trips to check it. He rolled up 2500 miles and more before he became convinced that it gives you the latest dope in most compact form. Conviction came to him as he watched review by the top tool-grinding expert of a major Midwestern plant. The T.T.G.E. swung to him and said: "Where *did* you get this stuff? You're 'way ahead of our practice! When can I have copies?"

That accolade somehow paid for the midnight oil.

Replacement Policy III . . . Depression, war-priority, retooling and bulk WAA purchases have all conspired to make many otherwise-sensible executives neglectful of equipment replacement. We'll confess we've been playing a gentle-reminder role these last months, hoping our suggestions would reawaken long-dormant policies. We tald about the Crompton & Knowles program June 5, described the Micro Switch system an issue or two later, now give you, in President Knowlson's own words, the story of how Stewart-Warner spends its replacement dollars. The three stories present ideas and methods that fit any plant and any circumstances, and should give you a core of purpose for a visit to the Machine Tool Show.

Interplant Transport . . . Many companies have the problem of transferring parts and subassemblies between remote departments or plants. E. R. Klein, production engineer for Mack Mfg., tells you how special racks and pallets are used by his company for transfer of truck and bus parts between two plants a mile and a quarter apart . . . Another automotive story, from Kaiser-Frazer, tells how they spotweld bodies.

Gourmet's Guide . . . Essential for keeping up your morale during your protracted Machine Tool Show visit is proper eating. The show itself is well outside Chicago, with the only eating facilities a cafeteria. We've therefore stepped out of our role as a production magazine for four pages to give you a list of places to eat in Chicago. We're not after Duncan Hines' laurels, just contributing to the corporal delinquency of our staff gourmet, Meanor.

Taft-Hartley Explained . . . Our 4-page explanation of labor gains from the Taft-Hartley bill is setting reprint records. Some 200,000 have been sold already. They're still available—at $2.50 a hundred, $20 a thousand.

Dreamer . . . This issue contains the swan-song of news sections handled by Associate Editor Harry Williams. He's doing what so many of us have lacked nerve to try—taking Horace Greeley's advice. He's cutting loose with his wife for a leisurely trip West, deciding, when he gets there whether he'll settle down. The rest of us sigh and survey our children and mortgages.

STATISTICIAN . . . Born and brought up on Long Island, Eleanor Merrill is our only female assistant editor. She was graduated from William Smith College in October '43, with a B.A. in business administration. There she was the first female editor of the college paper "The Herald of Hobart & W.S.C." She came to *American Machinist* immediately as assistant news editor, but her flair for statistics soon manifested itself. As a consequence, she played a major part in compiling our 1945 inventory and subsequent statistical and tabular material. She also handles regular news departments dealing with personnel and business changes.

Her femininity exerted itself for three months in 1945 when she was asst. handbag editor of "Luggage & Leather Goods," but she's now back at Metalworking and likes it.

YOU CAN'T AFFORD TO MISS

THE GREATEST MACHINE TOOL SHOW ON EARTH

See the

GLEASON

Exhibit

BOOTH 330

All roads lead to Chicago and the Machine Tool Show. Here, in one of the biggest plants in the world, will be displayed the largest, most modern machine tool show on earth . for the first time in a decade demonstrating to all the latest machine tool equipment and the newest Gleason bevel gear cutting equipment. Come, see for yourself . . bring your key personnel with you, see these newly developed machines guaranteed to produce more goods for more people at lower cost.

MACHINE TOOL SHOW

SEPTEMBER 17-26

CHICAGO, ILL.

GLEASON *Works*

1000 University Avenue

Rochester 3, N.Y., U.S.A.

Builders of Bevel Gear Machinery for Over Eighty Years

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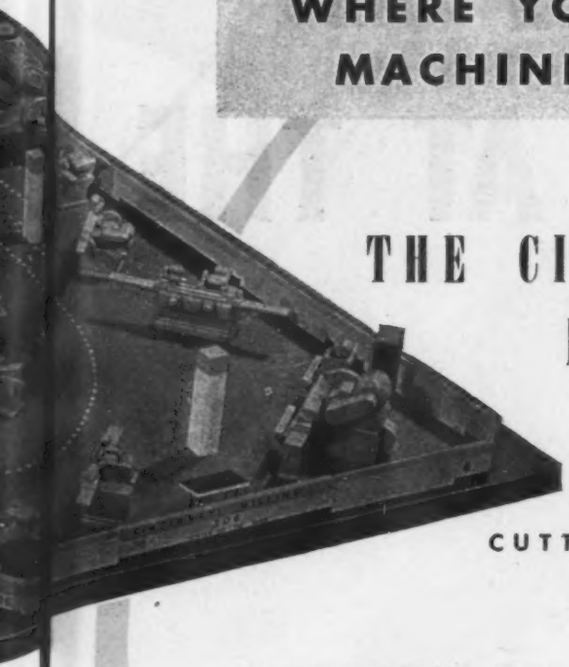
HOW TO GET THERE

Visit . . .

CENTER OF 306 THE SHOW

WHERE YOU SEE OVER 40 NEW MACHINE TOOLS IN ACTION!



THE CINCINNATI MILLING MACHINE CO.

MILLING MACHINES

BROACHING MACHINES

CUTTER SHARPENING MACHINES

•

CINCINNATI GRINDERS INCORPORATED

CENTER TYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES

CENTERLESS LAPPING MACHINES

In display area 306, center of the world's biggest machine tool show, you will see over 40 new machine tools in action . . . CINCINNATI Milling, Grinding, Broaching, Lapping, Cutter Sharpening, and Die-Sinking Machines. The complete CINCINNATI display is modeled at the left. While you're there, stop for a friendly visit with our field engineers in the central or international lounge areas. Remember the date . . . September 17 to 26, and the address: 306, center of the show.

CINCINNATI

Coming!

AT THE

A PREVIEW OF THE GIANT CUTTER PHOTOGRAPHED AND REPRODUCED ACTUAL SIZE.

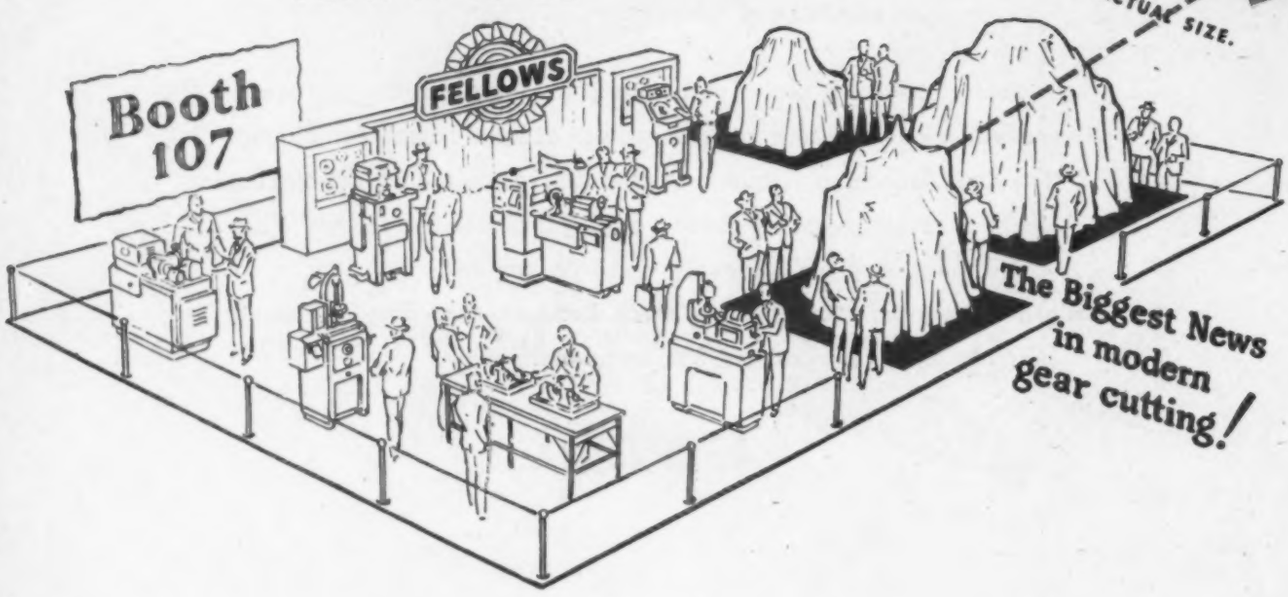
See it!

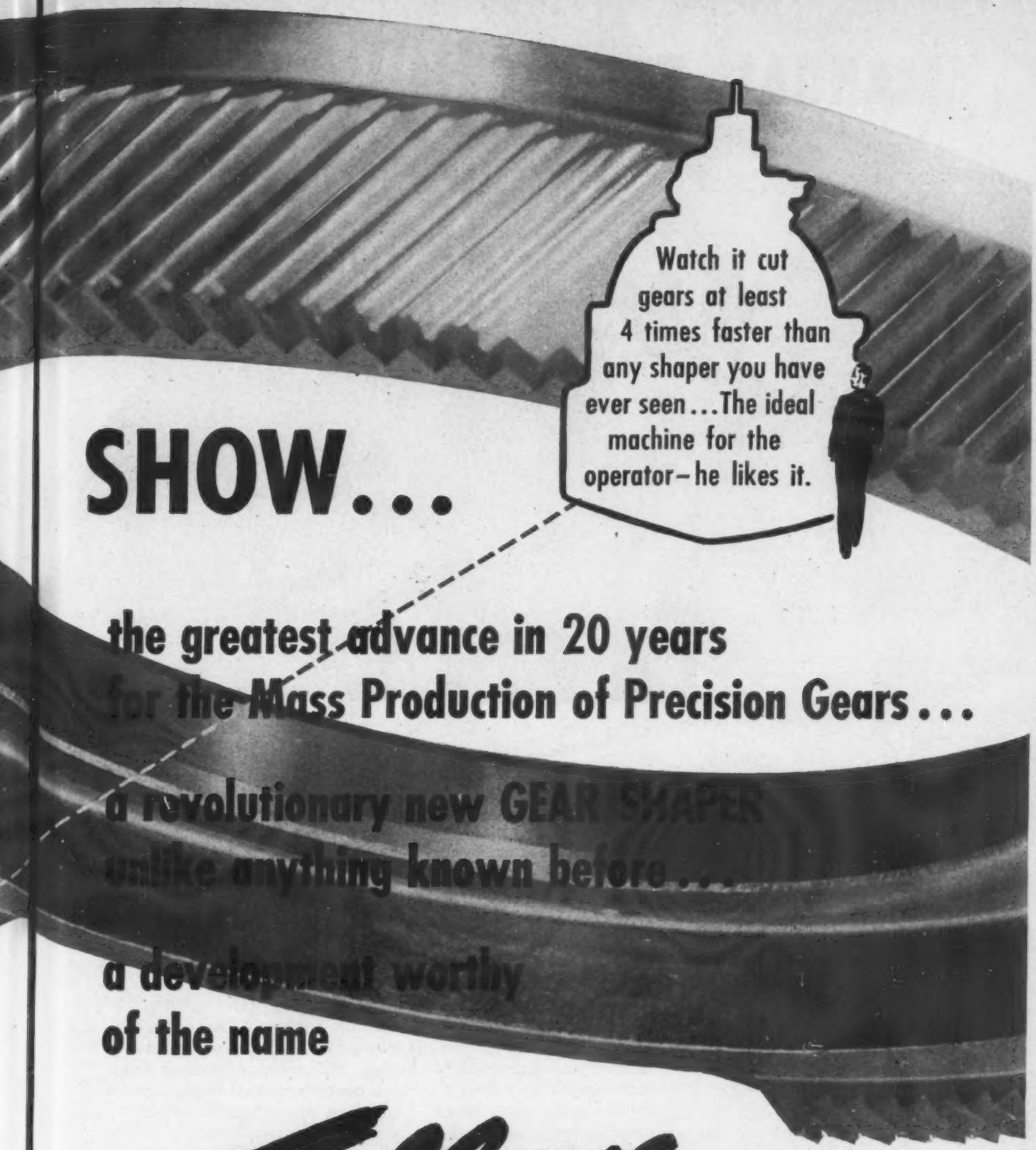
AT THE

MACHINE TOOL SHOW

CHICAGO

SEPT. 17 to 26




Watch it cut gears at least 4 times faster than any shaper you have ever seen...The ideal machine for the operator–he likes it.

SHOW...

the greatest advance in 20 years for the Mass Production of Precision Gears...

a revolutionary new GEAR SHAPER unlike anything known before....

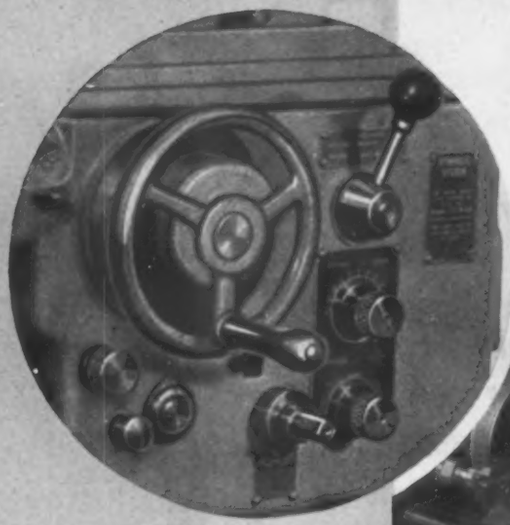
a development worthy of the name

Fellows

THE FELLOWS METHOD...MACHINES AND TOOLS FOR ALL OPERATIONS FROM BLANK TO FINISHED GEAR

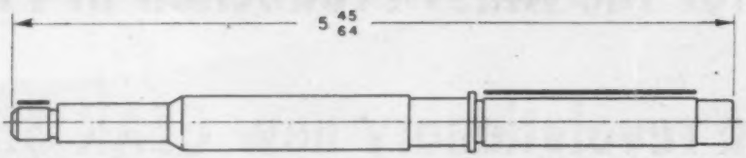
MANUAL EFFORT DOWN PRODUCTION UP...

IN PRECISION GRINDING ARMATURE SHAFTS



Above: AUTOMATIC INFEED on CINCINNATI FILMATIC 4" Plain Hydraulic Grinder. Stroke for the automatic infeed cycle adjustable for stock allowance up to .060", and retraction for loading and unloading up to 1".

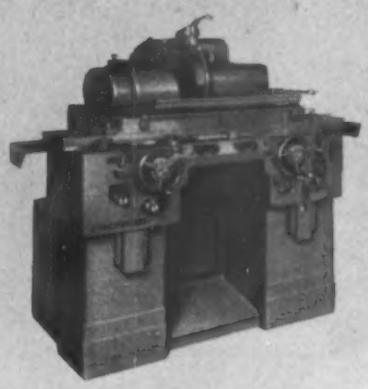
Right: HYDRAULIC FOOTSTOCK on CINCINNATI FILMATIC 4" Plain Hydraulic Grinder. In conjunction with loading cradles, it eliminates the operation of manually placing and removing the work between centers.



Drawing of armature shaft, infeed ground on CINCINNATI FILMATIC 4" Plain Hydraulic equipped with Automatic Infeed and Hydraulic Footstock. Production is 200 per hour for each diameter. Tolerances ½ of blueprint allowance. Heavy black lines indicate the two ground diameters.

When worker fatigue diminishes, production goes up. It's an old axiom, proved again by the equipment illustrated above. Here, armature shafts are ground at a production rate of 200 per hour. The machine is a CINCINNATI FILMATIC 4" Plain Hydraulic Grinder with production features consisting of: 1) Automatic Infeed Attachment, and 2) Hydraulic Footstock. These two features constitute an automatic infeed cycle which greatly reduces fatigue and increases production. ¶The entire cycle is automatic and very rapid: Footstock center engages work . . . work rotates and coolant starts . . . grinding wheel rapidly advances, grinds, tarries to spark-out and retracts . . . footstock center retracts. ¶It's only natural that a workman will turn out more work on a CINCINNATI FILMATIC 4" Plain Hydraulic because exceedingly close attention by the operator, and time-consuming motions of his hands, have been greatly reduced. Investigate this machine for your center-type work.

CINCINNATI



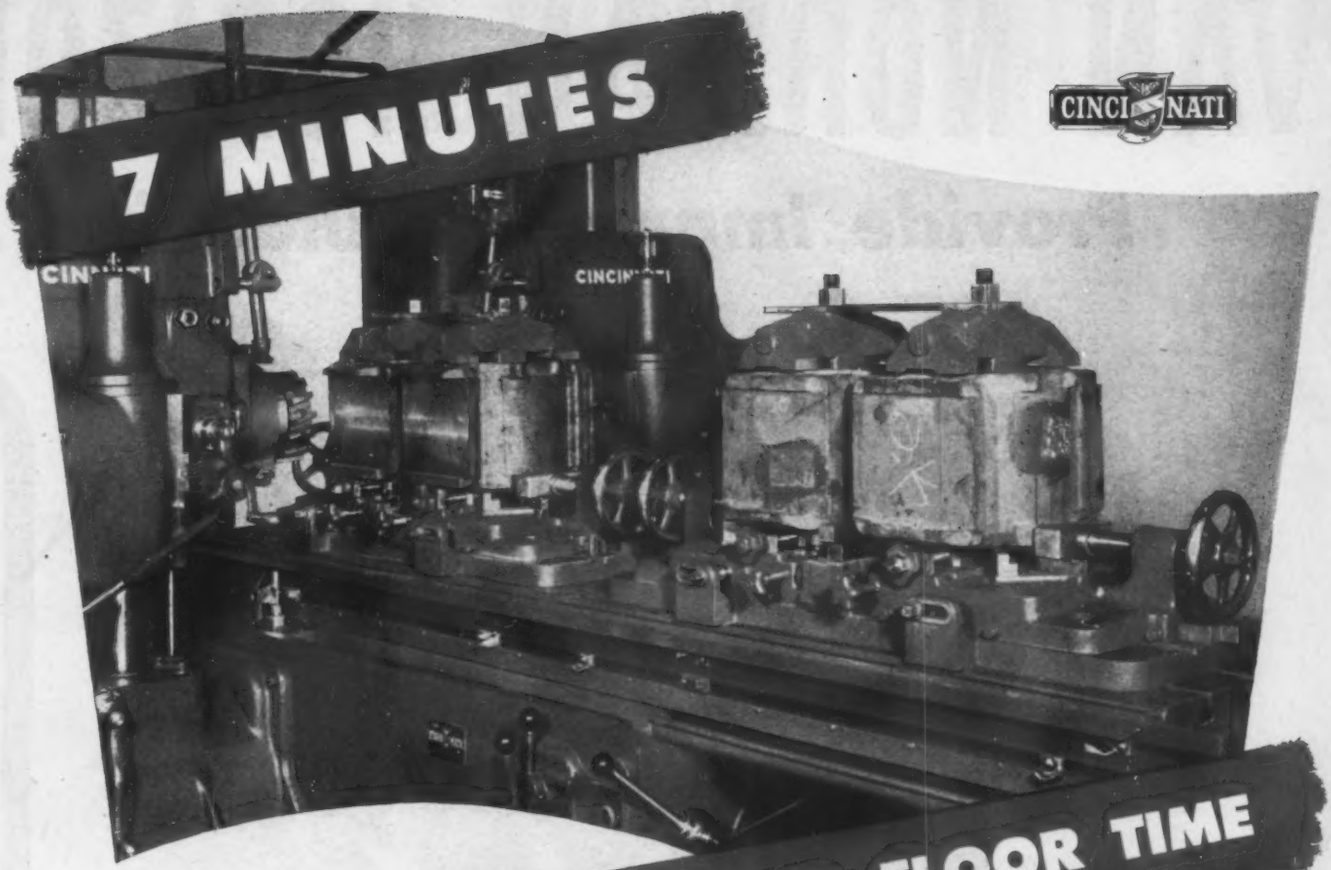
CINCINNATI FILMATIC 4" Plain Hydraulic Grinding Machines are built in 4" x 12", and 4" x 18" sizes. Complete specifications may be obtained by writing for catalog G-551.

See the CINCINNATI GRINDERS DISPLAY at the MACHINE TOOL SHOW, Booth No. 306 Chicago, Sept. 17-26

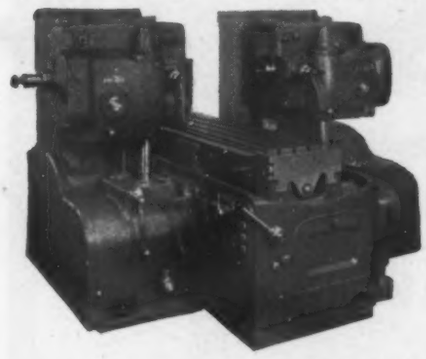
CINCINNATI GRINDERS INCORPORATED

CINCINNATI 9, OHIO, U. S. A.

CENTER TYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES • CENTERLESS LAPPING MACHINES



Milling the channels in journal boxes on a CINCINNATI No. 56-90 Duplex Hydromatic with extra features for railroad shops.



CINCINNATI No. 4-48 Duplex Hydromatic Milling Machine. Also built in plain style; 12 sizes of each from 24" to 90" table travel.

See the
CINCINNATI MILLING DISPLAY
at the MACHINE TOOL SHOW
Booth No. 306
Chicago, Sept. 17-26

. . . Duplex Milling the Channels in Journal Boxes

The CINCINNATI Hydromatic illustrated here mills the channels in both sides of cast steel journal boxes, taking a cut about 9" wide by 12½" long, averaging ⅜" deep. Two-way feed cycle and 90" table travel permits the use of two sets of fixtures. While two parts are being milled, the operator has plenty of time to reload the other two fixtures. The face mills are 9" diameter, and take the entire width of cut in one pass. ¶ CINCINNATI Hydromatics have ample power for work of this type; up to 50 hp in the larger sizes, if desired. And to keep down the cost of milling small quantities, Hydromatics may be equipped with quick setup features for railroad work, like the one in the illustration. It has verniers and scales for the spindle carriers and quills; quick clamping device for quills; counterweights for spindle carriers. ¶ Other features of CINCINNATI Hydromatics are equally important in railroad shops. Would you like to know more about them? Write for catalog M-1372-1 which contains complete specifications.

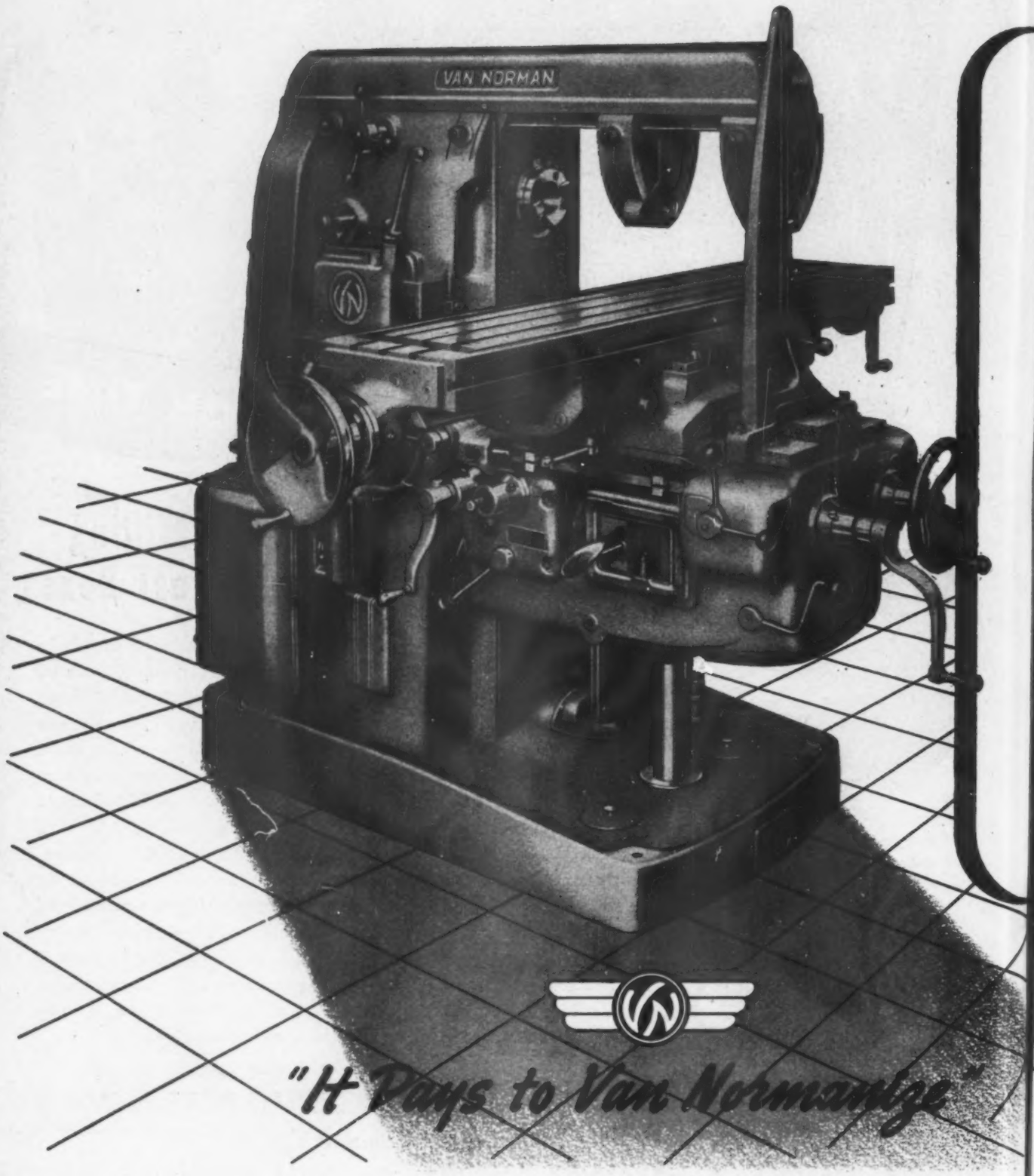
THE CINCINNATI MILLING MACHINE CO.

CINCINNATI 9, OHIO, U. S. A.

MILLING MACHINES • BROACHING MACHINES • CUTTER SHARPENING MACHINES

VAN NORMAN HORIZON T

Provide Improved Cutability . . .

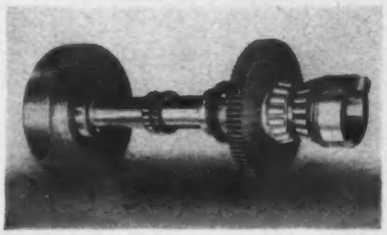


TAL MILLING MACHINES

Exceptional Ease of Control

Built-in Spindle Flywheel

The Van Norman spindle design incorporates a heavy flywheel mounted inside the column. It assures uniform, uninterrupted transmission of power to the cutter because it effectually cushions by its inertia, any fluctuation of speed and power. The flywheel increases and improves cutability . . . results in a smooth finish of work surface.

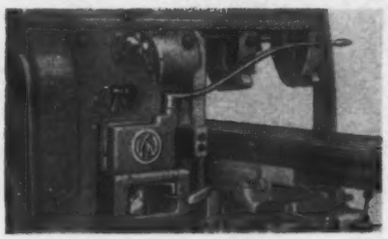


5-Bearing Spindle

The large diameter hardened alloy steel cutter spindle rotates on 5 anti-friction bearings. Large double-opposed taper roller bearings in front provide minimum overhang . . . center double-opposed taper roller bearings add rigidity. A straight roller bearing supports the rear. This construction assures maximum spindle support and rigidity under every type of cut.

Front & Rear Power Control

All power feed controls, as well as 6-way rapid traverse, can be operated from front or rear of the machine. This dual feed control simplifies operation, saves time, reduces worker fatigue. The finger tip controls are directional and can be operated either with spindle stopped or rotating.



Ease of Spindle Control

The single lever speed selector, convenient spindle reverse and spindle clutch levers are located on the side of the column for ease of control. The spindle clutch lever for starting and stopping the spindle is quickly adjusted to the desired and most convenient front or rear operating position.

From every angle, Van Norman Horizontal millers give you every advantage in cutability and ease of operation. These machines will give maximum quality service and increase production on a wide variety of general purpose and production milling. They are available in a wide variety of models and can be had with plain or univers[illegible] saddles. Write for complete information.

VAN NORMAN COMPANY

SPRINGFIELD 7, MASSACHUSETTS

THREADING PROBLEMS?

PRODUCTION?
ACCURACY?
ECONOMY?

The Solution

LANDMATIC HEADS

HARDENED & GROUND

For TURRET LATHE Threading Operations

LANDIS TRADE MARK REG. U.S. PAT. OFF.

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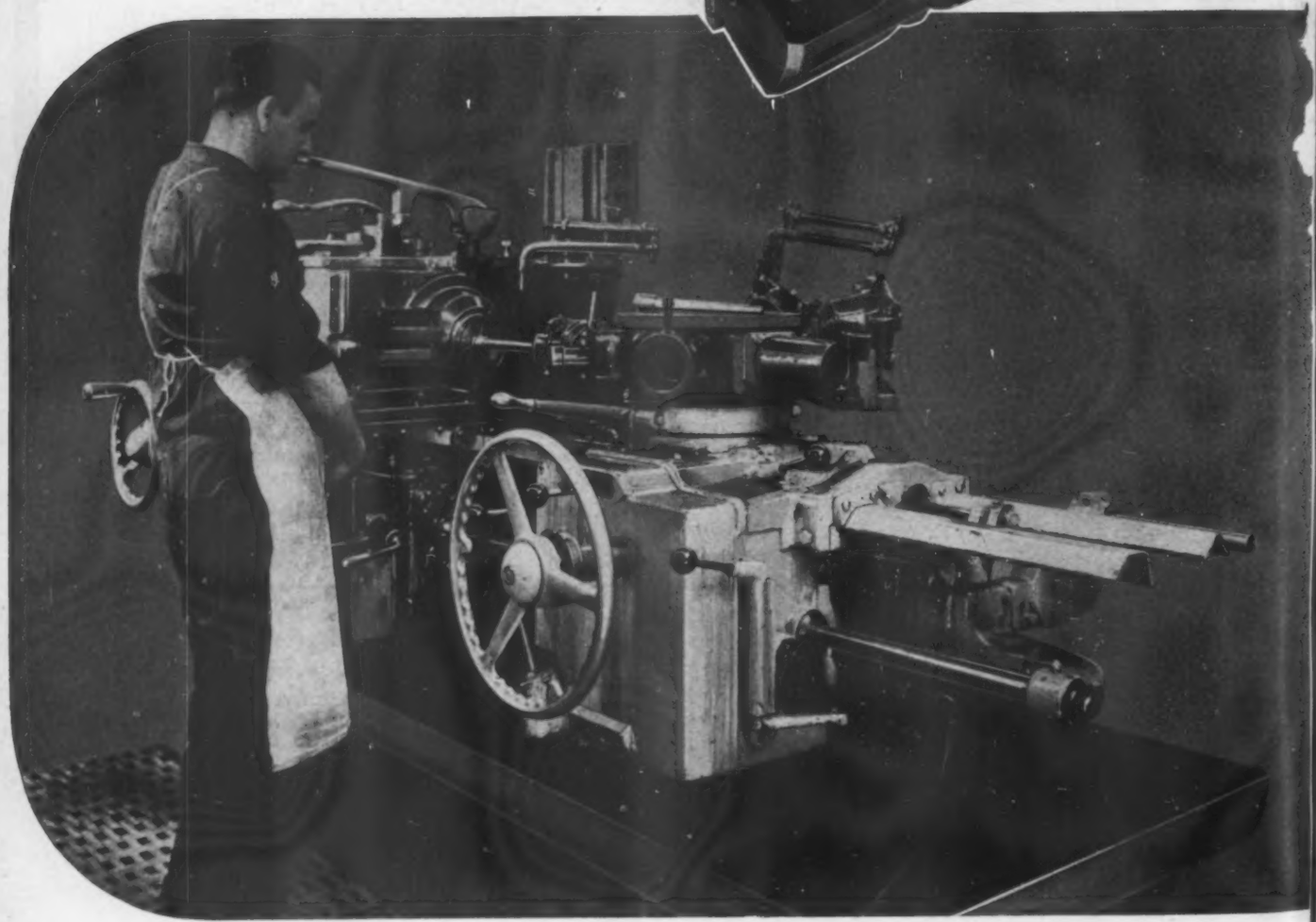
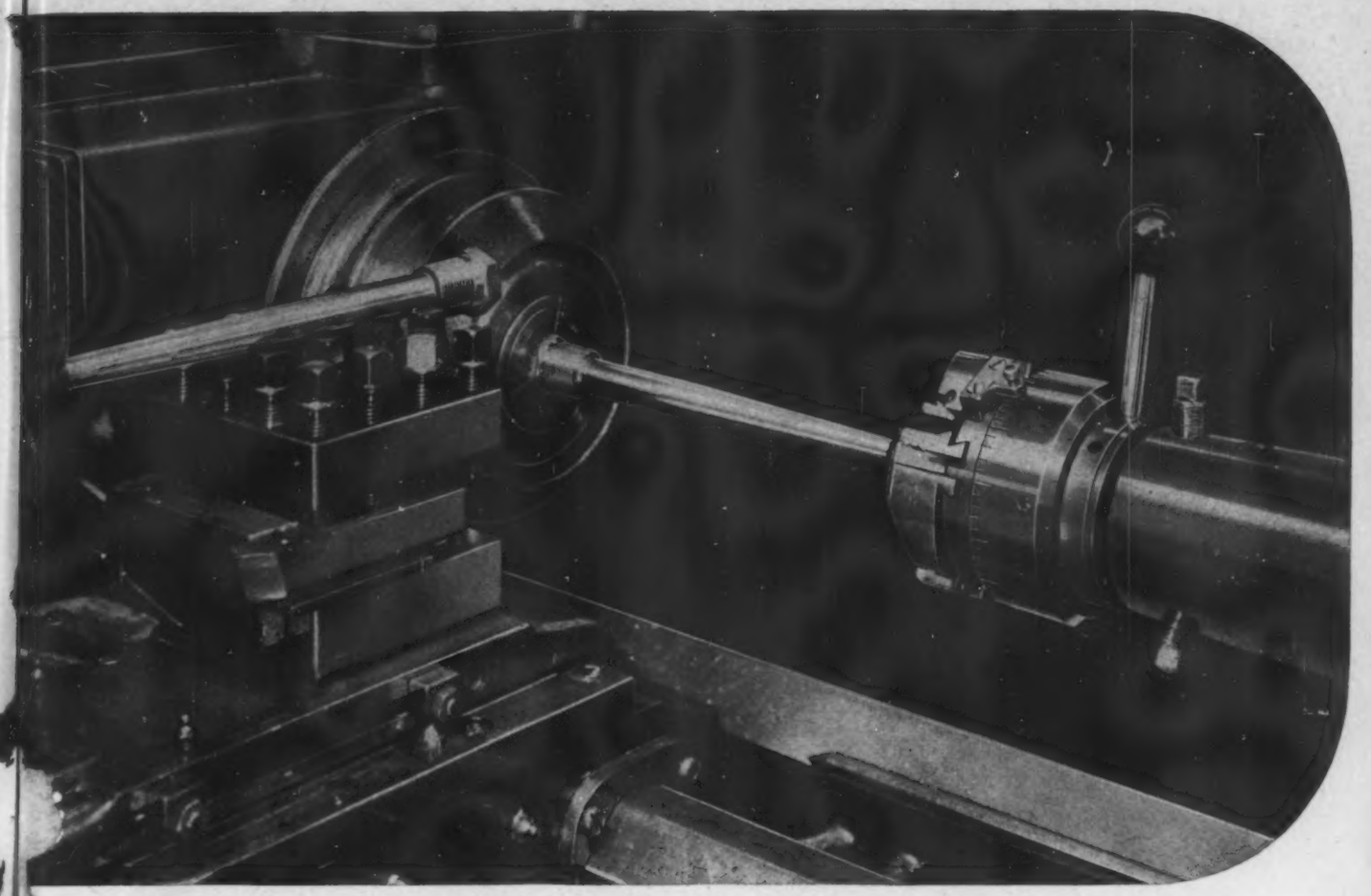




The LANDMATIC 1¼" Hardened and Ground Die Head is illustrated threading ¾" pipe on a turret lathe in the plant of a nationally-known precision instrument manufacturer. The Drilled Sockets being machined in the illustrations are used with pressure type thermometers as a protecting sheath for the thermometer bulb. These parts are also made in 1" and 1¼" sizes.

The Type H LANDMATIC Die Head is a stationary self-opening die head designed for turret lathes and automatic screw machines employing a stationary type head. It is made in ⅝", ⅞", and 1¼" sizes. The 1¼" size illustrated will cut pipe threads ranging from ⅛" to ¾" in diameter. The LANDMATIC Type H Die Heads can be equipped with oversize chaser holders which make possible the threading of diameters larger than the rated capacity of the die head.

Write for Bulletin F-80

The LANDIS CHASER

The Finest Thread Cutting Tool in Industry

LANDIS MACHINE COMPANY

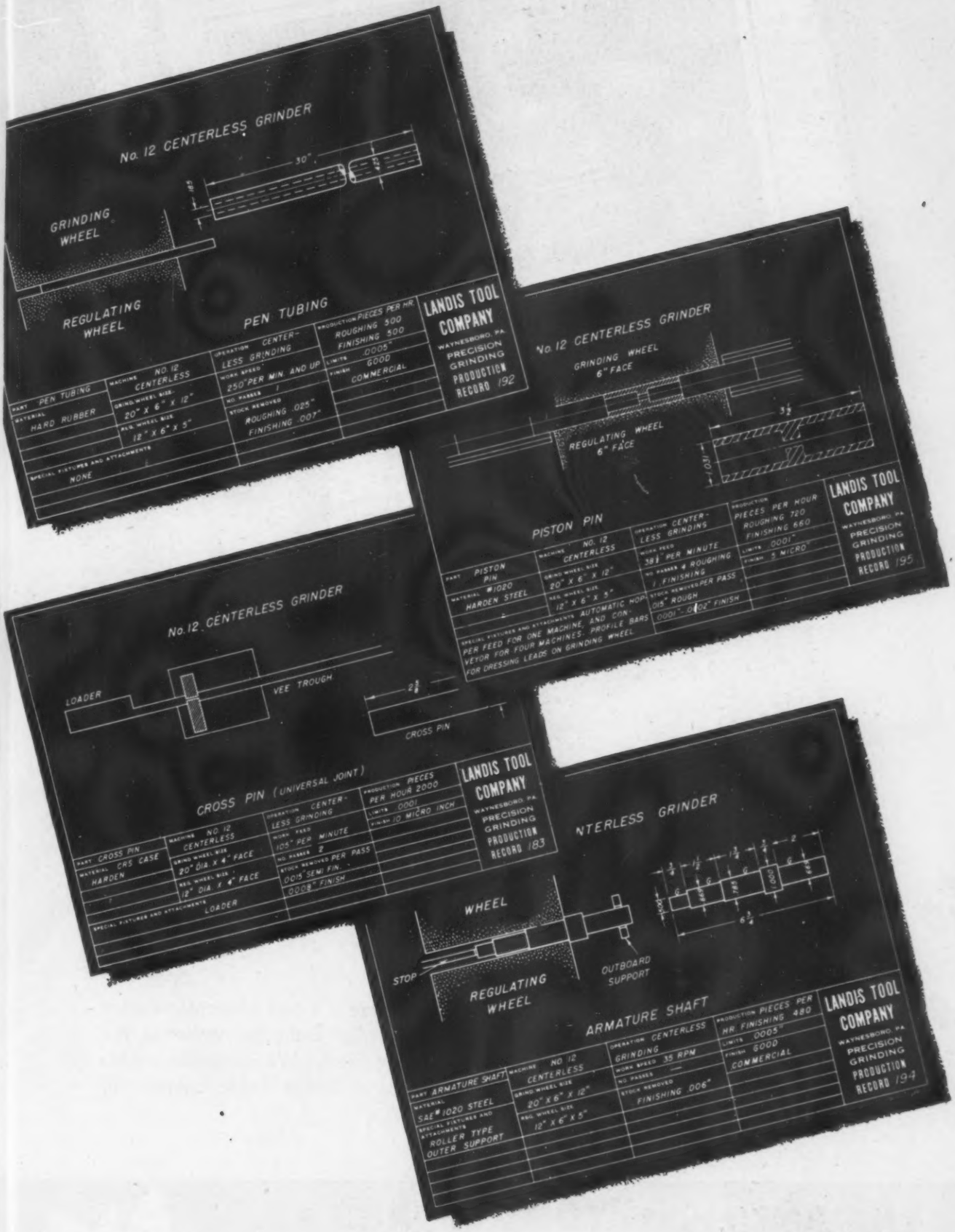
WAYNESBORO · PENNA · U·S·A·

still more

LANDIS TOOL
Precision Grinders

ask for Catalog T-47

Centerless Grinding Production Records


No. 12 CENTERLESS GRINDER
30"
GRINDING WHEEL
REGULATING WHEEL
PEN TUBING
PART PEN TUBING
MATERIAL HARD RUBBER
MACHINE NO. 12 CENTERLESS
GRIND WHEEL SIZE 20" X 6" X 12"
REG. WHEEL SIZE 12" X 6" X 5"
SPECIAL FIXTURES AND ATTACHMENTS NONE
OPERATION CENTER-LESS GRINDING
WORK SPEED 250' PER MIN. AND UP
NO. PASSES 1
STOCK REMOVED ROUGHING .025" FINISHING .007"
PRODUCTION PIECES PER HR. ROUGHING 500 FINISHING 500
LIMITS .0005"
FINISH GOOD COMMERCIAL
LANDIS TOOL COMPANY WAYNESBORO, PA. PRECISION GRINDING PRODUCTION RECORD 192
No. 12 CENTERLESS GRINDER
GRINDING WHEEL 6" FACE
REGULATING WHEEL 6" FACE
3½
PISTON PIN
PART PISTON PIN
MATERIAL #1020 HARDEN STEEL
MACHINE NO. 12 CENTERLESS
GRIND WHEEL SIZE 20" X 6" X 12"
REG. WHEEL SIZE 12" X 6" X 5"
SPECIAL FIXTURES AND ATTACHMENTS AUTOMATIC HOPPER FEED FOR ONE MACHINE, AND CONVEYOR FOR FOUR MACHINES. PROFILE BARS FOR DRESSING LEADS ON GRINDING WHEEL
OPERATION CENTER-LESS GRINDING
WORK FEED 38½ PER MINUTE
NO PASSES 4 ROUGHING 1 FINISHING
STOCK REMOVED PER PASS .015" ROUGH .0001" - .0002" FINISH
PRODUCTION PIECES PER HOUR ROUGHING 720 FINISHING 660
LIMITS .0001"
FINISH 5 MICRO"
LANDIS TOOL COMPANY WAYNESBORO, PA. PRECISION GRINDING PRODUCTION RECORD 195
No. 12 CENTERLESS GRINDER
LOADER
VEE TROUGH
2⅛
CROSS PIN
CROSS PIN (UNIVERSAL JOINT)
PART CROSS PIN
MATERIAL CRS CASE HARDEN
MACHINE NO. 12 CENTERLESS
GRIND WHEEL SIZE 20" DIA. X 4" FACE
REG. WHEEL SIZE 12" DIA. X 4" FACE
SPECIAL FIXTURES AND ATTACHMENTS LOADER
OPERATION CENTER-LESS GRINDING
WORK FEED 105" PER MINUTE
NO. PASSES 2
STOCK REMOVED PER PASS .015" SEMI FIN. .0008" FINISH
PRODUCTION PIECES PER HOUR 2000
LIMITS .0001"
FINISH 10 MICRO INCH
LANDIS TOOL COMPANY WAYNESBORO, PA. PRECISION GRINDING PRODUCTION RECORD 183
NTERLESS GRINDER
WHEEL
STOP
REGULATING WHEEL
OUTBOARD SUPPORT
ARMATURE SHAFT
PART ARMATURE SHAFT
MATERIAL SAE #1020 STEEL
SPECIAL FIXTURES AND ATTACHMENTS ROLLER TYPE OUTER SUPPORT
MACHINE NO. 12 CENTERLESS
GRIND WHEEL SIZE 20" X 6" X 12"
REG. WHEEL SIZE 12" X 6" X 5"
OPERATION CENTERLESS GRINDING
WORK SPEED 35 RPM
NO PASSES —
STOCK REMOVED FINISHING .006"
PRODUCTION PIECES PER HR. FINISHING 480
LIMITS .0005"
FINISH GOOD COMMERCIAL
LANDIS TOOL COMPANY WAYNESBORO, PA. PRECISION GRINDING PRODUCTION RECORD 194

A Precision Lathe: One of the many precision tools now serving the government at Arthur Tickle Engineering Works, Inc.

accurate machine operations

by super-skilled mechanics have played a vital role in our military efforts. In war as in peace, Arthur Tickle Engineering Works, Inc., has made painstaking perfectionism its goal. Through 41 years of service, our plant has earned a distinguished reputation based on fine machine equipment skillfully operated by able, ambitious workmen.

The Tickle Engineering Works offer the following services: Engineers—Boiler Makers—Builders of Special Machinery—Machine Work—Metal Spraying—Engine Repairs—Internal Grinding—Precision Cylindrical Grinding—Forging —Boiler Repairs—Welding.

ARTHUR TICKLE ENGINEERING WORKS, Inc.

21 DELEVAN STREET, BROOKLYN 31, N. Y.

The Customer should know—

HE USES THEM . . . Here is a case where a customer features his "American" Pacemaker Lathe to symbolize the high quality of the work he produces. We salute the excellent judgment and perspicacity of Arthur Tickle Engineering Works, Inc. of Brooklyn, N. Y.

THE AMERICAN TOOL WORKS CO.

Cincinnati 2, Ohio, U. S. A.

LATHES AND RADIAL DRILLS

The CONE AUTOMATIC MACHINE COMPANY

sees many

GOOD THINGS AHEAD

It is reported that . . . . . .

White Sewing Machine Co. stores its lumber on wheels, thus reducing the number of handlings from six to one.

get ready with CONE for tomorrow

Chesapeake and Ohio is planning to buy a thousand freight cars equipped with roller bearings.

be ready with CONE for today

Commonwealth Edison Co. has a "cyclone" burner in its Calumet Station that removes 80% of the coal ash as molten slag in the burner.

get ready with CONE for tomorrow

Britain's Southern Railroad is faying track in complete prefabricated 60-foot sections.

be ready with CONE for today

Caterpillar Tractor Co. is using electronic rectifiers in place of motor-generator sets to convert AC current to DC for the operation of machine tools.

get ready with CONE for tomorrow

Manuel Gonzales, a Civil Engineer of Mexico City, builds multiple story, poured concrete buildings by laying the top floor first and suspending the forms for each floor from the one above.

be ready with CONE for today

Timken-Detroit saves 400 pounds in the weight of its new heavy-duty tandem truck axle by using aluminum in housing, hubs and brake shoes.

get ready with CONE for tomorrow

DuPont is building a plant at Niagara Falls to make furfural from farm waste. The furfural will be made into Nylon.

be ready with CONE for today

American Optical Company has a new glass which absorbs 90% of yellow light and which is expected to be useful in goggles for workmen fusing glass in a sodium flame.

get ready with CONE for tomorrow

Simonds Saw & Steel Co. has a new dial indicator that registers the tension on a hack saw blade.

Electronic heating equipment made by Induction Heating Corp. reduces to seconds the time required to bake foundry sand cores.

be ready with CONE for today

A radiation counter that operates over a wider range than the familiar Geiger counter has been developed by Westinghouse.

get ready with CONE for tomorrow

Verdi Bros. of Jersey City are bringing the old-fashioned oak beer keg up to date by making it of nine-ply laminated wood.

be ready with CONE for today

The Armzen Co., of Middletown, Ohio, has designed a miniature cold strip mill for Westinghouse to roll their new magnetic alloy "Hiperco" as thin as .002 in.

A method of electroplating, in which the current is periodically reversed, has been developed by Westinghouse. The deposited film is said to be more dense and so smooth as to require no polishing.

get ready with CONE for tomorrow

Detroit Diesel Engine Div. of General Motors is in production on a new hydraulically operated transmission for their engines.

be ready with CONE for today

Pezzillo Pump Co. is making an electric pump that can be installed directly in a pipe line like any other fitting. The impeller and rotor are integral and the liquid flows through the motor.

get ready with CONE for tomorrow

A possible answer to the need for heat and stress resistant material for gas turbines, jets and rockets is a new crystalline porcelain announced by the U. S. Bureau of Standards.

FOLLOW THESE PAGES FOR NEWS OF PROGRESSIVE PRODUCTION

CHICAGO SHOW

CONOMATIC REVIEW

This page, September issue, will feature

NEW MODELS

innovations — improvements

•

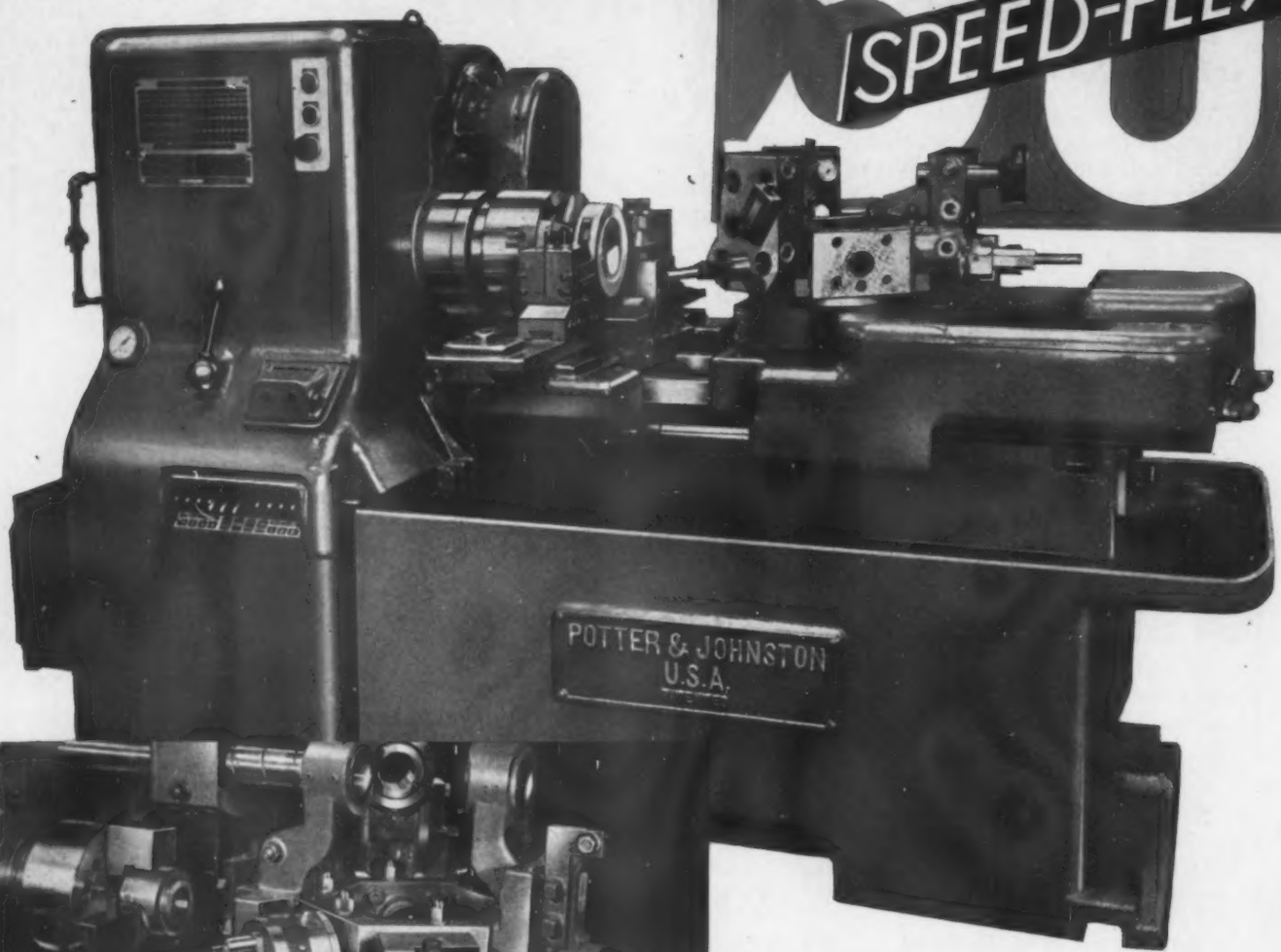
CONE

AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U.S.A.

42

TOOLING: A typical tooling set-up on the new 3 U SPEED-FLEX Automatic Turret Lathe is shown below, and a comparative view of the new 3 U SPEED-FLEX and the P & J 9 D—the largest and the smallest Automatics in the complete P & J line. THE SPEED-FLEX TAKES ONLY 10 SQUARE FEET OF FLOOR SPACE.

3U SPEED-FLEX



MACHINE TOOL SHOW M T CHICAGO SEPT. 11-16

P & J AUTOMATICS will be demonstrated in action at BOOTH 43

P & J

BRINGS AUTOMATIC PRODUCTION SPEED - CONVENIENCE - ECONOMY TO A NEW RANGE OF JOBS

Now you can get all the advantages of P & J automatic production on machining castings and forgings up to 6" in diameter, 4" long. The new 3 U SEED-FLEX Automatic Turret Lathe combines highest output per spindle with lowest cost per operator on work which formerly may have required a number of handlings. Spindle speeds range from 73-1445 R.P.M., or if a dual range is needed, from 36-711 and 73-1445 R.P.M. Rigid construction throughout, with ample power and positive alignment and locking of turret, enable full use to be made of tungsten carbide tools. Each set of easily changed hand pick-off gears, make available four automatic changes of speed and three automatic changes of feed. All changes are made by the operation of multiple disc clutches of ample capacity, which are engaged or disengaged by solenoid controlled air cylinders actuated by dogs on the control drum. Accurate setting of these dogs is possible, so that non-cutting time is held to a minimum. Further time savings are made possible by the rapid, positive operation of the turret slide, which can be controlled to drop from rapid traverse into feed for ¼" of travel and back to rapid traverse in 2 seconds, using top speed and .010" feed. Cross slides act either independently or simultaneously with any or all of the six turret face. All gearing is of chrome vanadium steel, heat treated and shaved. Spindle and all high speed shafts are mounted on anti-friction bearings.

Built by the pioneer manufacturer of Automatic Turret Lathe, the new 3 U SPEED-FLEX rounds out the complete P & J line of 12 different sizes. Send us your tooling problems, and have us make suggestions and time studies that will demonstrate 3 U speed and economy on your own work. Potter & Johnston Machine Company, Pawtucket, Rhode Island.

OUTSTANDING FEATURES

Modern, rigid construction throughout bed, turret and cross slides, with box type of base.

All high speed shafts and spindle mounted on anti-friction bearings.

Hardened and ground steel ways for turret slide mounted in base. Hardened and ground steel inserts in turret slide.

All gearing of chrome vanadium steel, heat treated and shaved.

Full electric controls. Automatic stop at completion of work cycle. Complete safety features for protection of machine and operator.

Turret automatically clamped in position after indexing. Combination locking and binding wedge assures accurate alignment with spindle.

Bijur lubrication of turret slide and bed ways. Cascade oiling of all bearings and gearing in aluminum gear box.

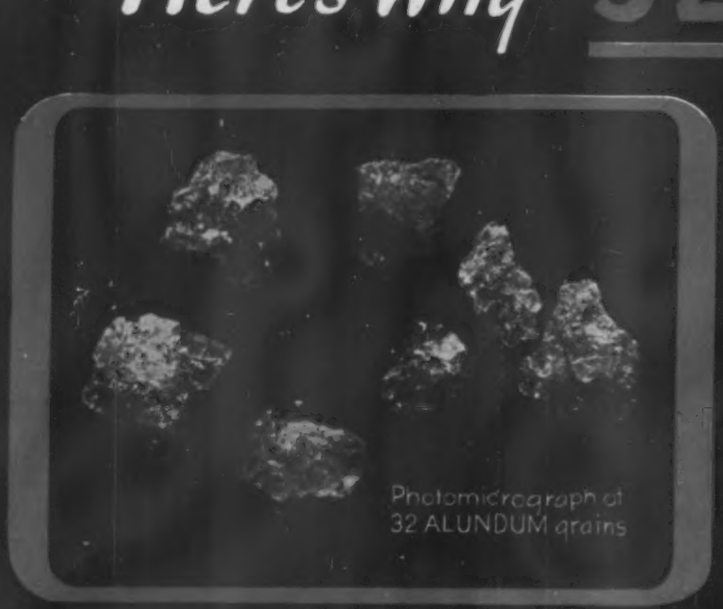
Standard spindle speed range: 73—1445 R.P.M. Optional dual range: 36—711 and 73—1445 R.P.M.

Swing over cross slide: 8¾". Cross slide travel each way: 2½". Turret slide travel: 6".

Operating air cylinders made of copper ferrite honed to .0002". Piston of hardened steel Parker Luberized to prevent rusting from water in air line.

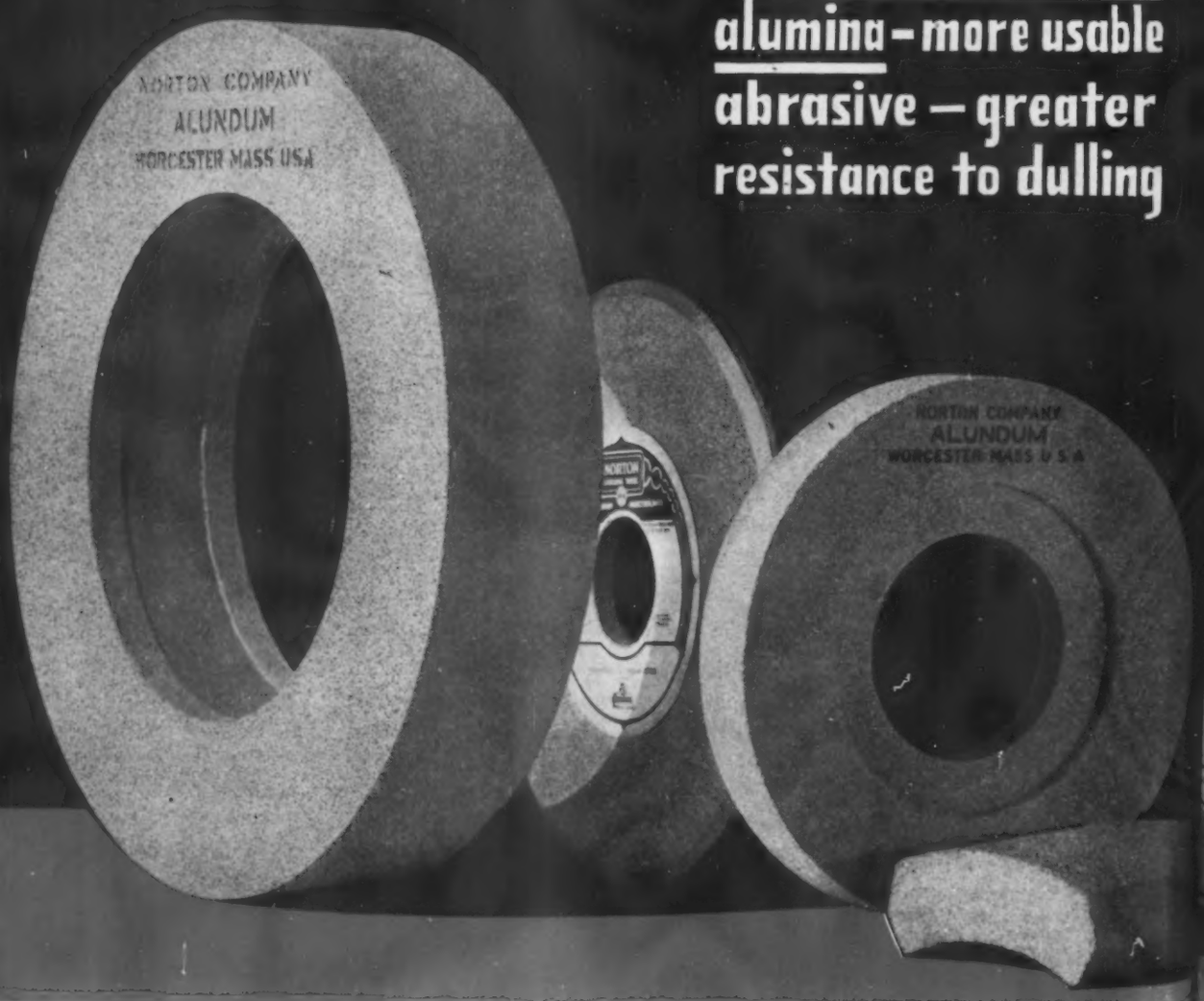
PIONEERS IN BUILDING AUTOMATIC CHUCKING AND TURNING MACHINES

Here's Why 32 ALUNDUM A



The Grains are Sharper for faster cutting.

The Grains are over 99% pure fused alumina – more usable abrasive – greater resistance to dulling



Abrasive is Cutting Grinding Costs

32 ALUNDUM abrasive is an entirely *new type* of aluminum oxide — made differently by a Norton-invented and Norton-patented process.

Each grain is a single, complete crystal — individually produced in the electric furnace — *not crushed to size*. Each crystal has many sharp points on *all sides*.

Each crystal is over 99% pure fused alumina — over 99% *usable abrasive* — no slag, no pores. The grains stay sharp longer.

The greater number of longer-lasting cutting points doing the work means that a 32 ALUNDUM grinding wheel removes stock *more rapidly*. Because grinding heat is spread over more points, and points that stay sharp longer, "32" wheels *cut cooler*. Because there are more points doing the work and points that don't dull quickly, 32 ALUNDUM wheels require *fewer dressings and last longer*.

32 ALUNDUM grinding wheels are available in *all* customary grinding wheel sizes and in a wide range of grit sizes.

NORTON COMPANY, WORCESTER 6, MASS.
Distributors in All Principal Cities

W-1127

INTERNAL GRINDING

"Six Times Faster Cutting Action — Longer Life — Less Dressing"

A Massachusetts maker of hardened steel dies finds that a 32 ALUNDUM internal wheel removes .003" of stock per pass compared to .0005" for previous wheels. It gives an excellent finish, has three times the life and requires no dressing.

TOOL GRINDING

"Cut Twice as Fast, Cut Cooler and Held Size Accurately"

A Michigan manufacturer finds that a 32 ALUNDUM wheel for resharpening inserted blade, high speed steel reamers not only cuts faster and cooler but permits twice the depth cut and holds size completely around the tool.

CYLINDRICAL GRINDING

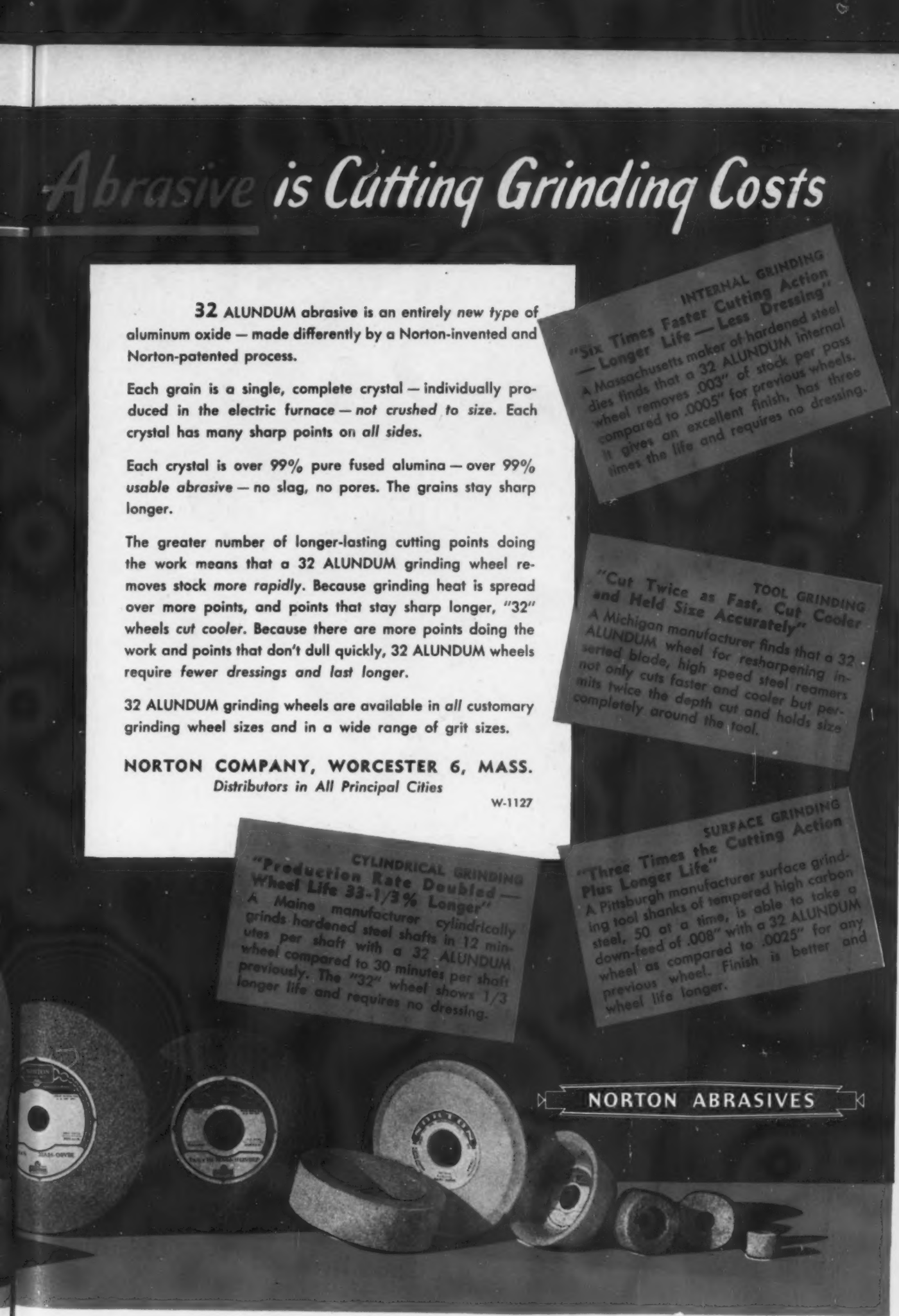
"Production Rate Doubled — Wheel Life 33-1/3% Longer"

A Maine manufacturer cylindrically grinds hardened steel shafts in 12 minutes per shaft with a 32 ALUNDUM wheel compared to 30 minutes per shaft previously. The "32" wheel shows 1/3 longer life and requires no dressing.

SURFACE GRINDING

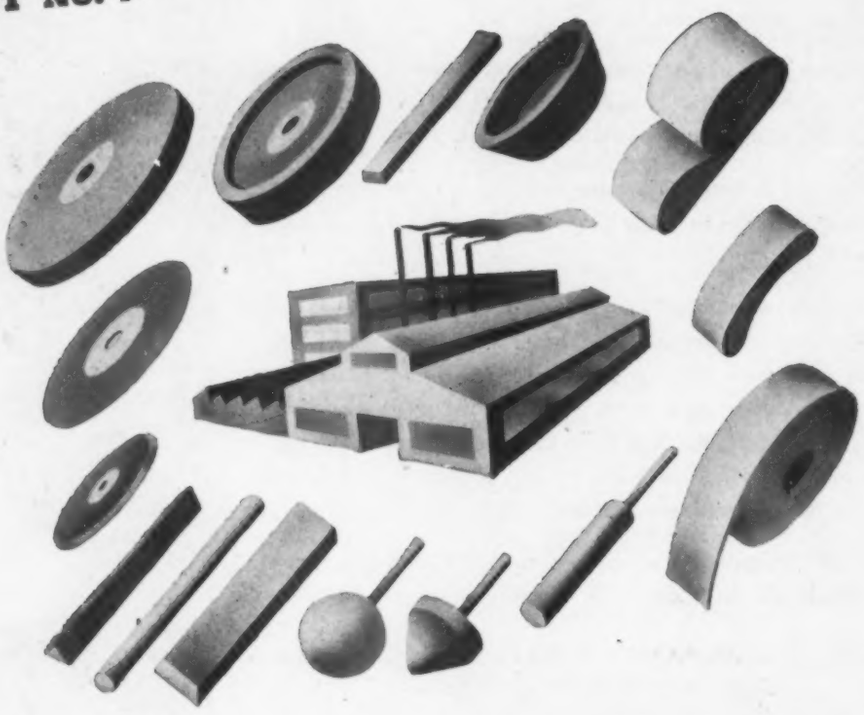
"Three Times the Cutting Action Plus Longer Life"

A Pittsburgh manufacturer surface grinding tool shanks of tempered high carbon steel, 50 at a time, is able to take a down-feed of .008" with a 32 ALUNDUM wheel as compared to .0025" for any previous wheel. Finish is better and wheel life longer.



A BUYING GUIDE FOR ABRASIVES

POINT No. 9



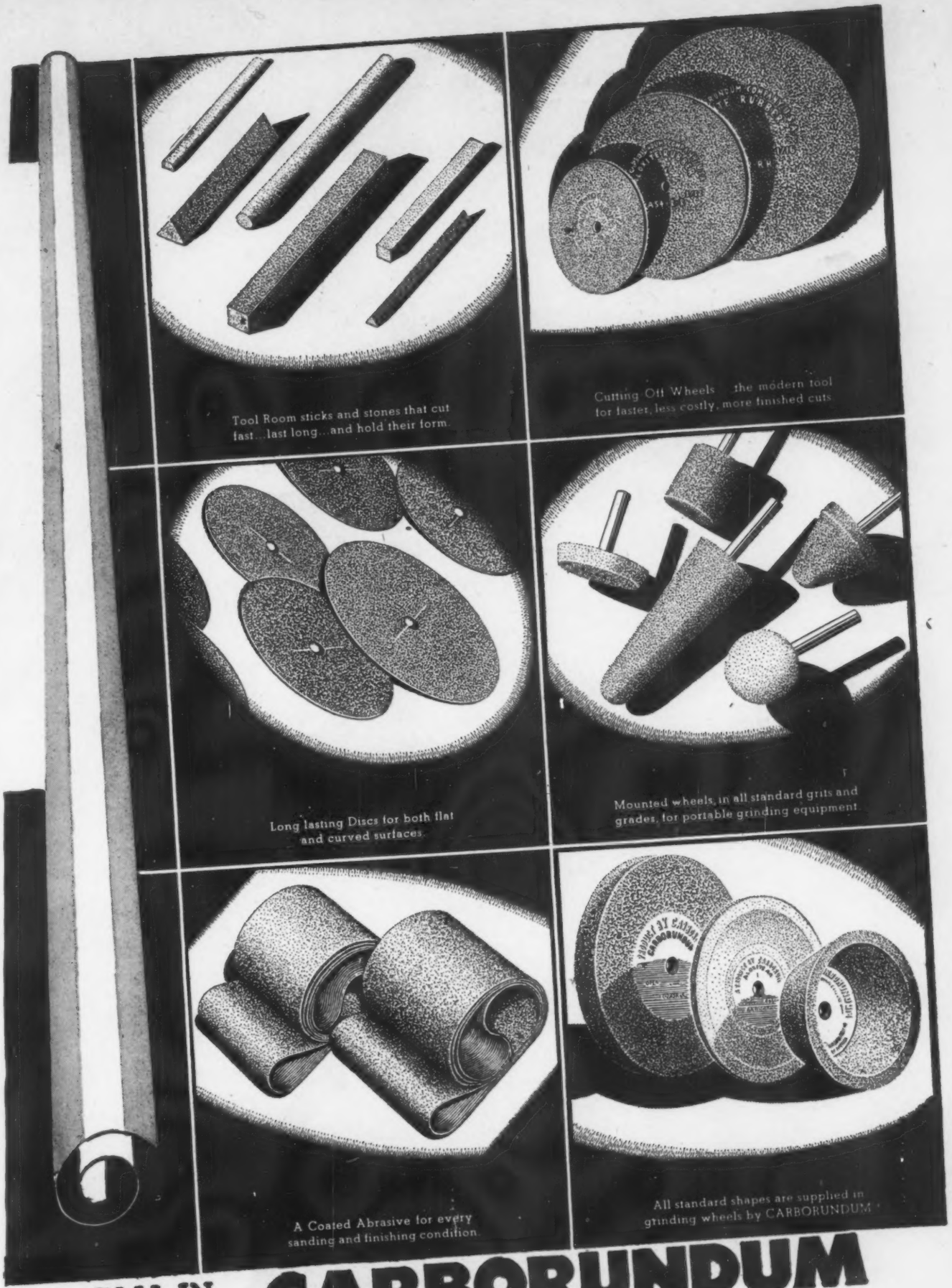
Complete Line of Abrasives

The Carborundum Company makes the only complete line of abrasives produced under one trade mark.

With industrial techniques utilizing a wider variety of different type abrasives, it is only logical that users turn to The Carborundum Company as the one primary source for all abrasive needs. Product quality is known and highly regarded. Specialized service on all abrasive problems and applications is covered by experienced representatives who are free to recommend the best abrasive products for your requirements. Satisfaction is assured. Of even more importance to many, responsibility is definitely fixed and undivided. For reasons such as these, there is an increasing preference for products by CARBORUNDUM. The Carborundum Company, Niagara Falls, N.Y.

CARBORUNDUM

A Good Rule for Good Grinding



Tool Room sticks and stones that cut fast... last long... and hold their form.

Cutting Off Wheels ... the modern tool for faster, less costly, more finished cuts

Long lasting Discs for both flat and curved surfaces.

Mounted wheels, in all standard grits and grades, for portable grinding equipment.

A Coated Abrasive for every sanding and finishing condition.

All standard shapes are supplied in grinding wheels by CARBORUNDUM.

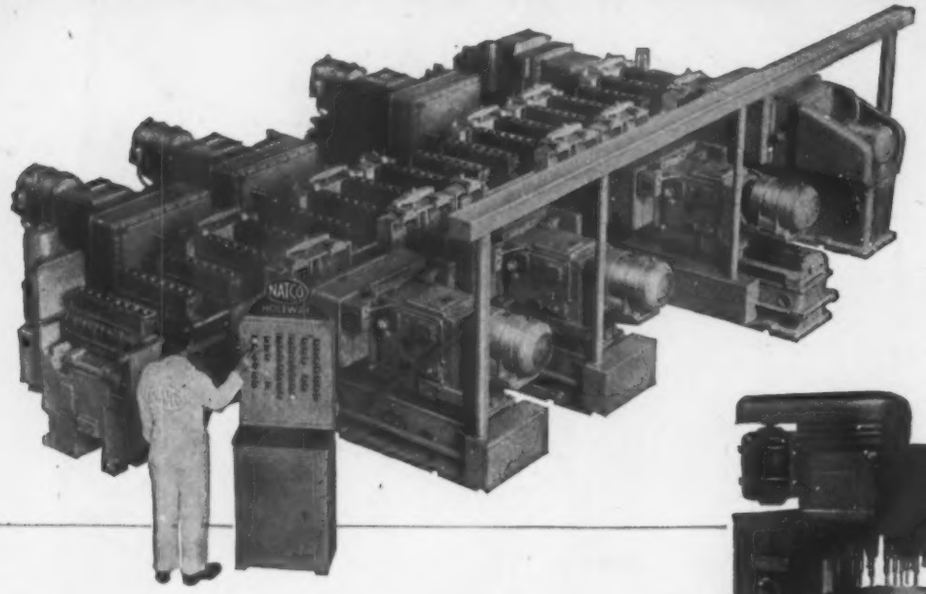
... CALL IN CARBORUNDUM TRADE MARK

● BONDED ABRASIVES ● COATED ABRASIVES ● ABRASIVE GRAINS AND COMPOUNDS

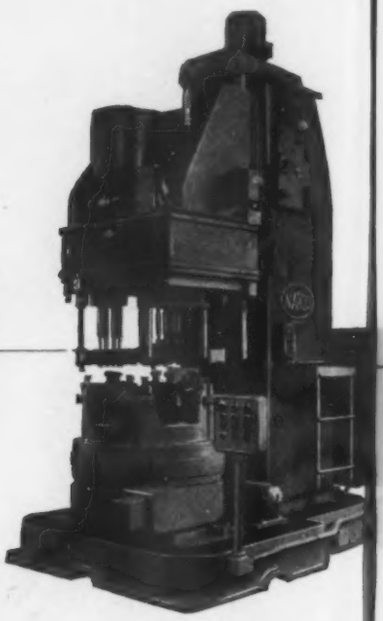
NATCO

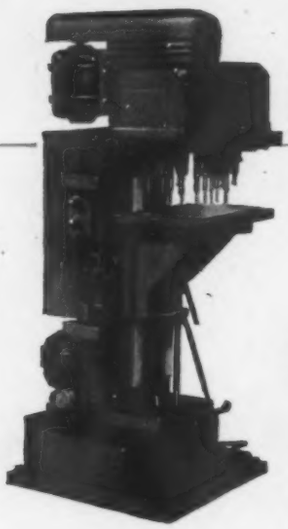
Complete Range of sizes and

NATCO LEADERSHIP IS THE RESULT OF ENGINEERING SKILL

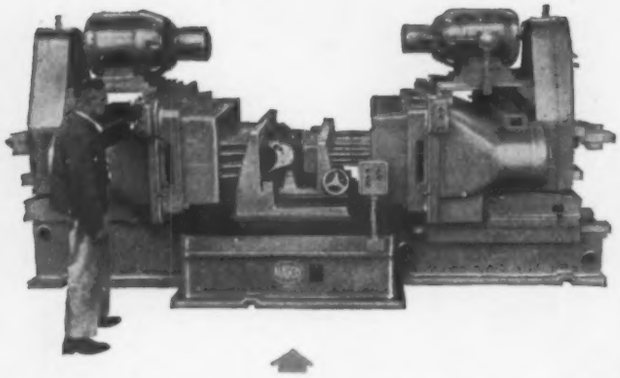


NATCO HOLEWAY AUTOMATIC PROCESSING MACHINE



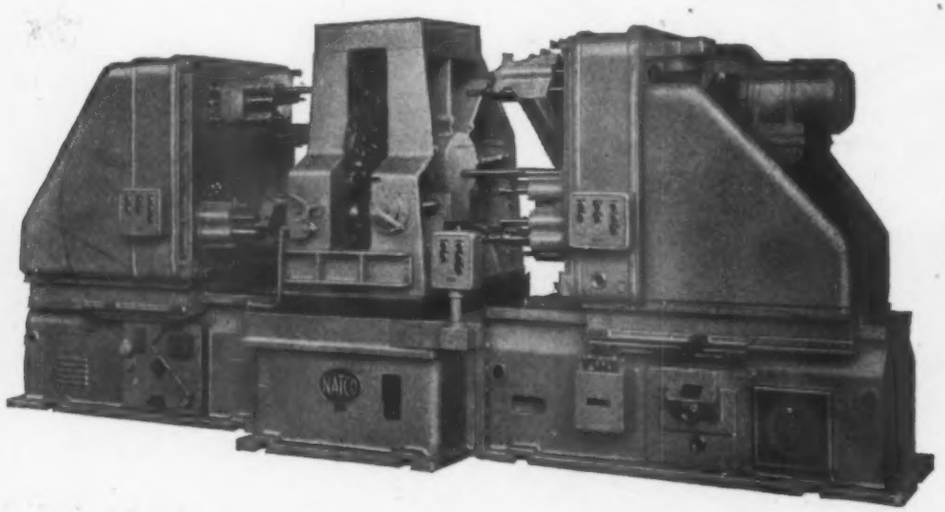


NATCO HOLESTEEL ADJUSTABLE DRILLER AND TAPPER



NATCO TWO-WAY TAPPER WITH INDIVIDUAL LEAD SCREW

NATCO LIGHT SENSITIVE DRILLER AND TAPPER

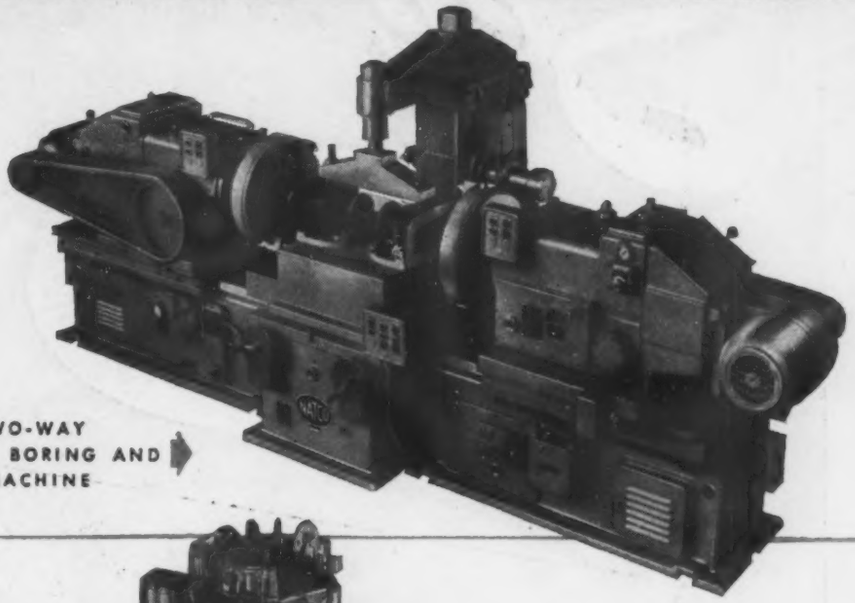


NATCO TWO-WAY TRUNNION TYPE DRILLING MACHINE

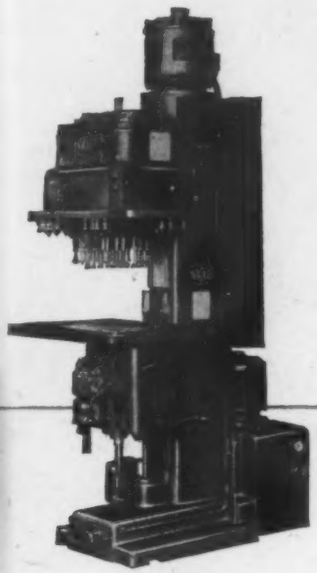
NATIONAL AUTOMATIC TOOL COMPANY, INC., RICHMOND, INDIANA, U.S.A. • *Branch Offices:* 1809 Engineering Building, Chicago • 409 New Center Building, Detroit • 1807 Elmwood Avenue, Buffalo • 2902 Commerce Building, New York City

types of DRILLING, BORING, TAPPING and FACING machines

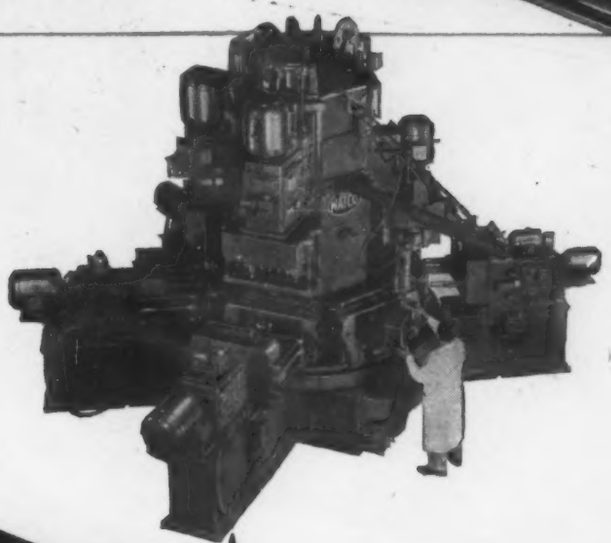
AND QUALITY WORKMANSHIP BACKED BY NEARLY A HALF CENTURY OF EXPERIENCE



NATCO TWO-WAY
TURNING, BORING AND
FACING MACHINE



NATCO HIGH SPEED
SENSITIVE DRILLER AND TAPPER



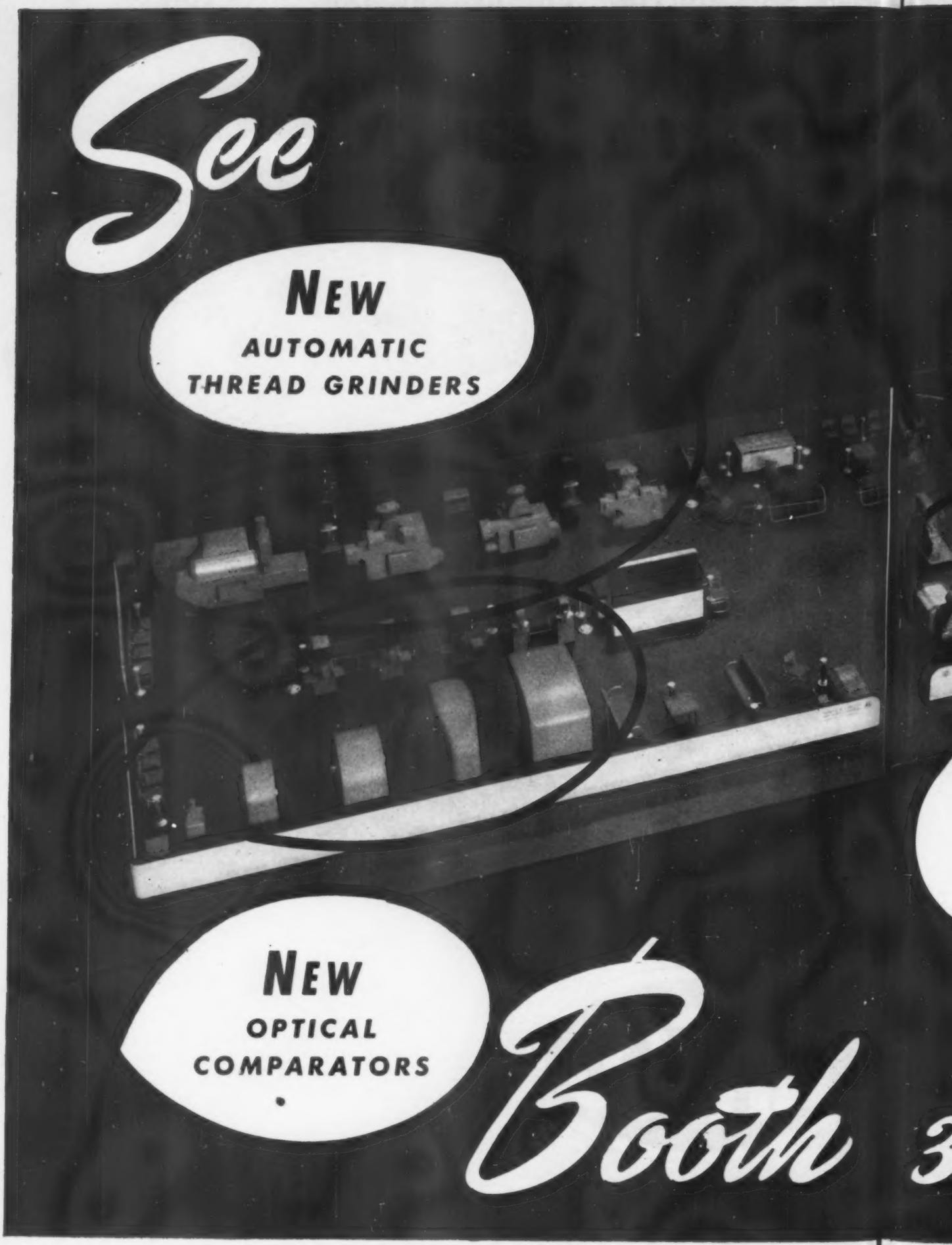
NATCO STATION
TYPE MACHINE

See our Booth NO. 4

AT THE NATIONAL MACHINE TOOL BUILDERS ASS'N. SHOW
SEPT 17TH THROUGH SEPT 26TH AT CHICAGO

NATCO

Call a Natco Field Engineer


See
NEW
AUTOMATIC
THREAD GRINDERS
NEW
OPTICAL
COMPARATORS
Booth

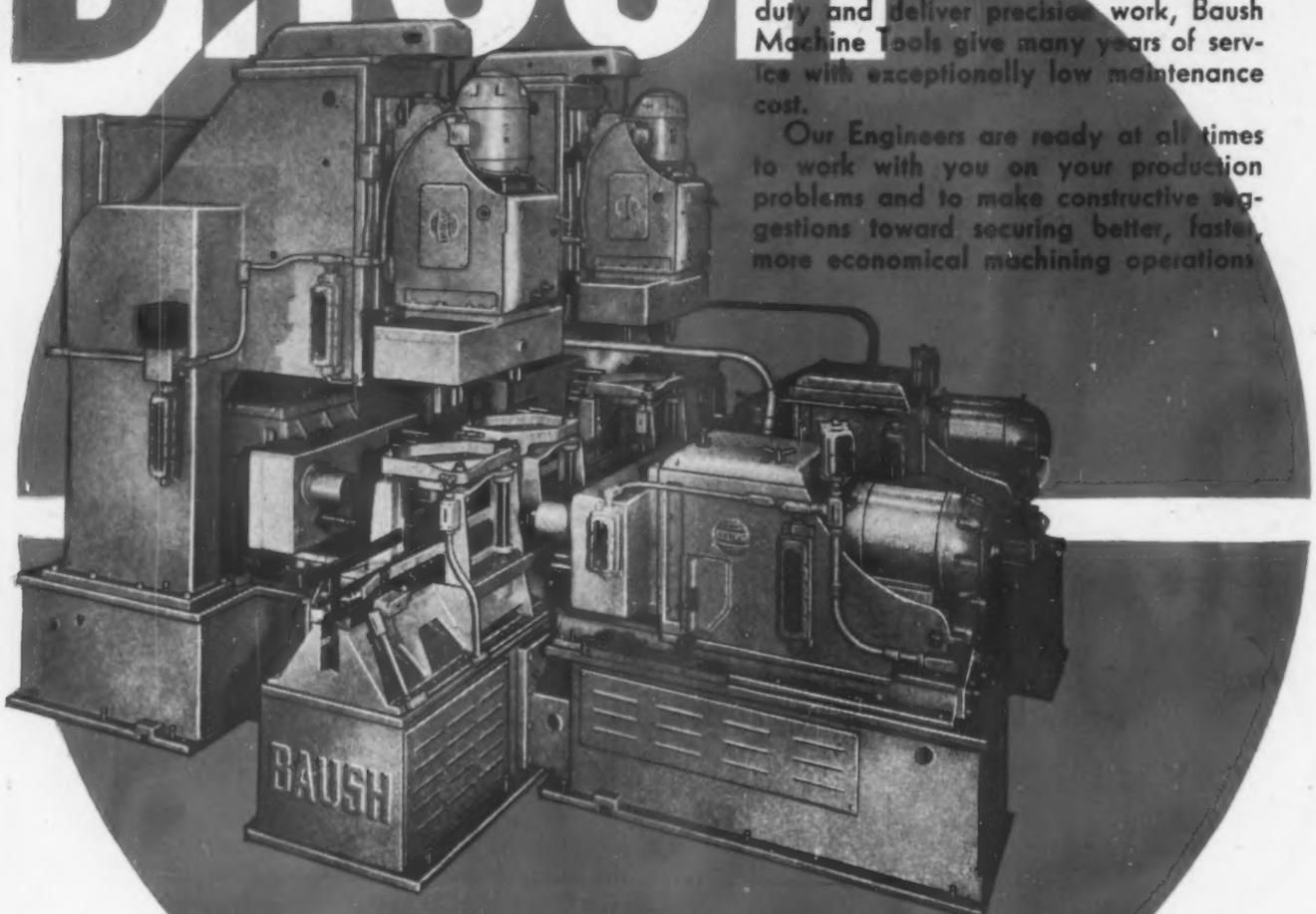
NEW
TURRET LATHES
NEW
FAY AUTOMATIC
LATHES
DO NOT MISS THIS EXHIBIT
JONES & LAMSON will present a complete line of —
UNIVERSAL TURRET LATHES
FAY AUTOMATIC LATHES
AUTOMATIC THREAD GRINDERS
OPTICAL COMPARATORS
AUTOMATIC OPENING THREADING DIES AND CHASERS
You Will See: Machines designed to meet present day competition by producing your products quicker, better and at lower cost.
You Will See: Jones & Lamson Turret Lathes and Fay Automatic Lathes removing metal at astonishing rates, with precision and accuracy — Mass Production Thread Grinding at its best — The world's most complete line of Comparators for inspection by optical projection.
You Will Meet: Jones & Lamson Engineers ready to discuss any or all of your production problems.
326

BAUSH MACHINE TOOL COMPANY

. . . has maintained its leadership in the machine tool field, for over 50 years, by the ability of Baush Engineers to design multiple spindle machine tools and single purpose multi-operation units, that speed up production with less manpower, and yet in no way sacrifice the quality of machined work.

Ruggedly built to withstand heavy duty and deliver precision work, Baush Machine Tools give many years of service with exceptionally low maintenance cost.

Our Engineers are ready at all times to work with you on your production problems and to make constructive suggestions toward securing better, faster, more economical machining operations.



AUTOMATIC TRANSFER MACHINES

Two 3-Way Hydraulic Drilling Machines which are part of a 12-Machine Transfer Line used for boring, drilling, reaming, counterboring, chamfering, recessing, spotfacing, milling and tapping Automotive Transmission Cases. Baush has sectionalized the transfer machine so that individual units, or machines, are more independent than the conventional operator loading and unloading lines, thus eliminating any troubles which would shut down the whole line in a conventional transfer line-up. Each machine loads, locates and clamps part and ejects part at end of cycle onto loading station of next machine. Individual electric control panels on each machine control cycle of each unit, making it easy to locate any trouble which might arise.

The machines shown here are equipped with Baush self-contained hydraulic units and also self-contained hydraulic transfer mechanism.

The transmission case is completed on all sides and, as it progresses down the line with valve-face down, an automatic indexing fixture indexes the part 90 deg. horizontally, thus bringing the bottom face and the top face into position for machining. As the part progresses, an automatic checking fixture checks holes prior to tapping and, at the 12th machine, an automatic indexing fixture indexes the part 90 deg. vertically, thus bringing the valve face into position for tapping.

Number of operations performed — 369

Production — 45 per hour — using only (2) operators.

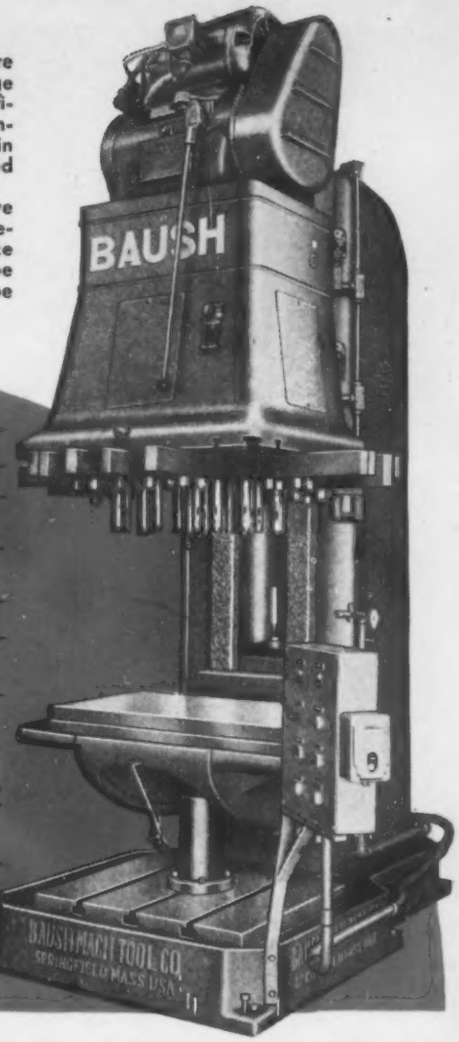
SEE THESE MACHINE TOOLS IN BOOTH No. 38 AT THE SHOW

"W" TYPE MACHINES

Baush "W" Type machines are especially adaptable for both flange drilling and rectangular layouts. Available in 3 sizes, shown in specifications, with adjustable arms to handle drilling of hole centers that constantly vary — or with master-bored cluster plate having spindles in fixed pattern to fit one operation. Horsepower capacities are graduated to cover predominant drilling operations.

Spindle heads are of adjustable, joint driven type, with slip sleeve spindles that can be furnished in various standard sizes to meet work requirements. "W" Type machines are arranged for 18" maximum stroke of heads — adjustable feed rates — 2 speed geared yokes and can be adapted for tapping. Either adjustable knee tables or box table can be supplied as an extra.

Also available in single way — 2-way or 3-way machines.



SPECIFICATIONS OF STANDARD W-TYPE MACHINES

	W-6	W-7	W-8
Maximum Horsepower Capacity for Spindle Drive	10 H.P.	20 H.P.	30 H.P.
Top of Base to Bottom of Head Flange, Head up	60"	54"	50"
Max. Standard Stroke of Head	18"	18"	18"
Overall Height of Machine with low base	139"	141"	150"
Approximate Net Weight of Machine (lbs.)	15,000	20,000	27,000
Head Sizes available — Measurements taken between Spindle centers as follows: At Side, S. At Front, F.	18"S. x 24"F. 18"S. x 36"F. 24" round	20"S. x 30"F. 20"S. x 45"F. 32" round 36" round	20"S. x 30"F. 20"S. x 52"F. 32" round

TABLE FEED MACHINE

Multiple Spindle Vertical Drilling Machine of compact construction and convenience of operation.

Iron casting heavily ribbed, minimizing vibration and assuring accurate spindle alignment. Spindles and Gearing in Head are the only rotating parts.

Work is fed by hydraulically operated table which permits feeding both up and down.

Special Features: Low pressure hydraulic pump minimizes maintenance and pump pulsations — Table feed by ram directly below table center — Easy, convenient controls — Taps as well as drills.

Table stroke 6" — Spindles from 5/8" to 1½" diameter. Head 10" x 15", or 14" round. Head can be bushed from 8 to 24 spindles. Working surface 15" x 15". Distance from floor to top of table 41". Floor space 34" x 54". Horsepower 7½. Weight 4200 lbs.

MODEL #46

High Speed Multiple Driller and Tapper

For small diameter holes and layouts. Hydro-pneumatic feed using air-cylinder from line for pressure.

Feed easily adjusted to give feed in both directions, with or without quick approach and quick return.

Motor can be furnished for one direction for drilling only or reversing with limit switch for drilling and tapping.

Table can be adjusted for setting at various heights.

Spindles are adjustable type.

Head 8" round. Number of spindles 12, either 5/8" or 3/4" diameter.

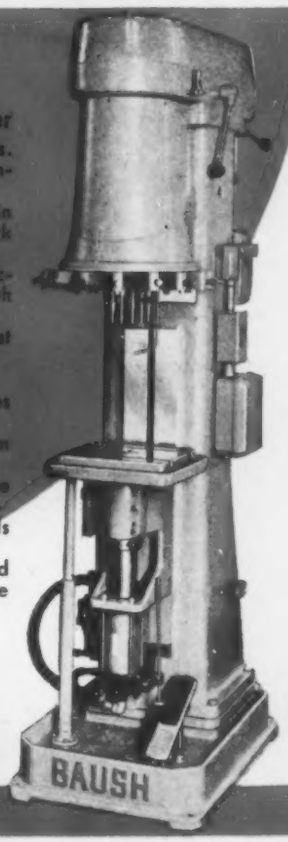
Maximum feed stroke 4", maximum adjustment of table less feed 12".

Height machine 5' 10", floor space 25" x 19".

Drill capacity 12 1/8"-diameter drills driven by 1 Horsepower Motor.

Spindle speeds 750 — 1150, 1750 and 2600 R.P.M., [illegible] if angle of spindle drive does not exceed 10°

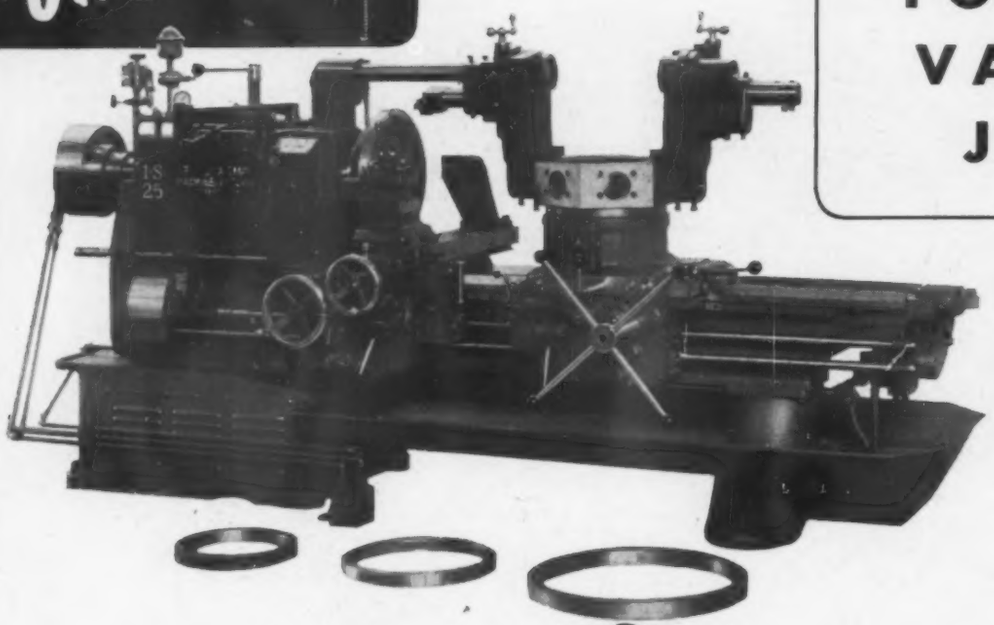
Weight 1100 lbs.



BAUSH MACHINE TOOL CO.
SPRINGFIELD 7, MASSACHUSETTS

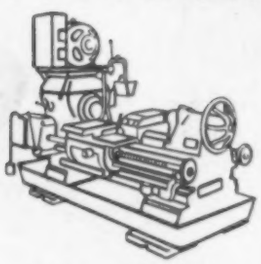
"DOING THE UNUSUAL"

A TOUGH VALVE JOB...

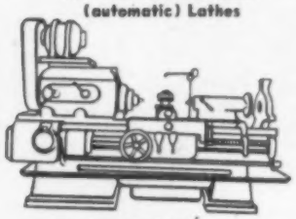


1947 MACHINE TOOL SHOW CHICAGO

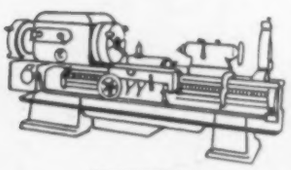
.... DONE ON Lodge & Shipley ACME TURRET LATHES



2A and 3A Duomatic (automatic) Lathes



Engine, Tool Room and Manufacturing Lathes



Hollow Spindle Lathes

The long life demanded of big gate valves in heavy service calls for utmost precision in manufacturing. And that's where Lodge & Shipley Acme Turret Lathes come in . . . turning the "tough jobs" into run-of-the-shop operations . . . doing unusual jobs with speed, accuracy and low cost.

This valve job is performed on standard Lodge & Shipley Acme Turret Lathes fitted with special tooling devised by Lodge & Shipley Engineers.

This **No. 1 S 25"** Fixed Center Universal Turret Lathe is equipped with an air operated fixture which eliminates distortion when valve ring is chucked. Adjustable overhead turning heads provide quick means for setting cutters with minimum overhang on various diameter rings.

For rapid production of your difficult jobs, call on your nearby Lodge & Shipley representative. The experience of lathe specialists is at your command.

THE **Lodge & Shipley** COMPANY

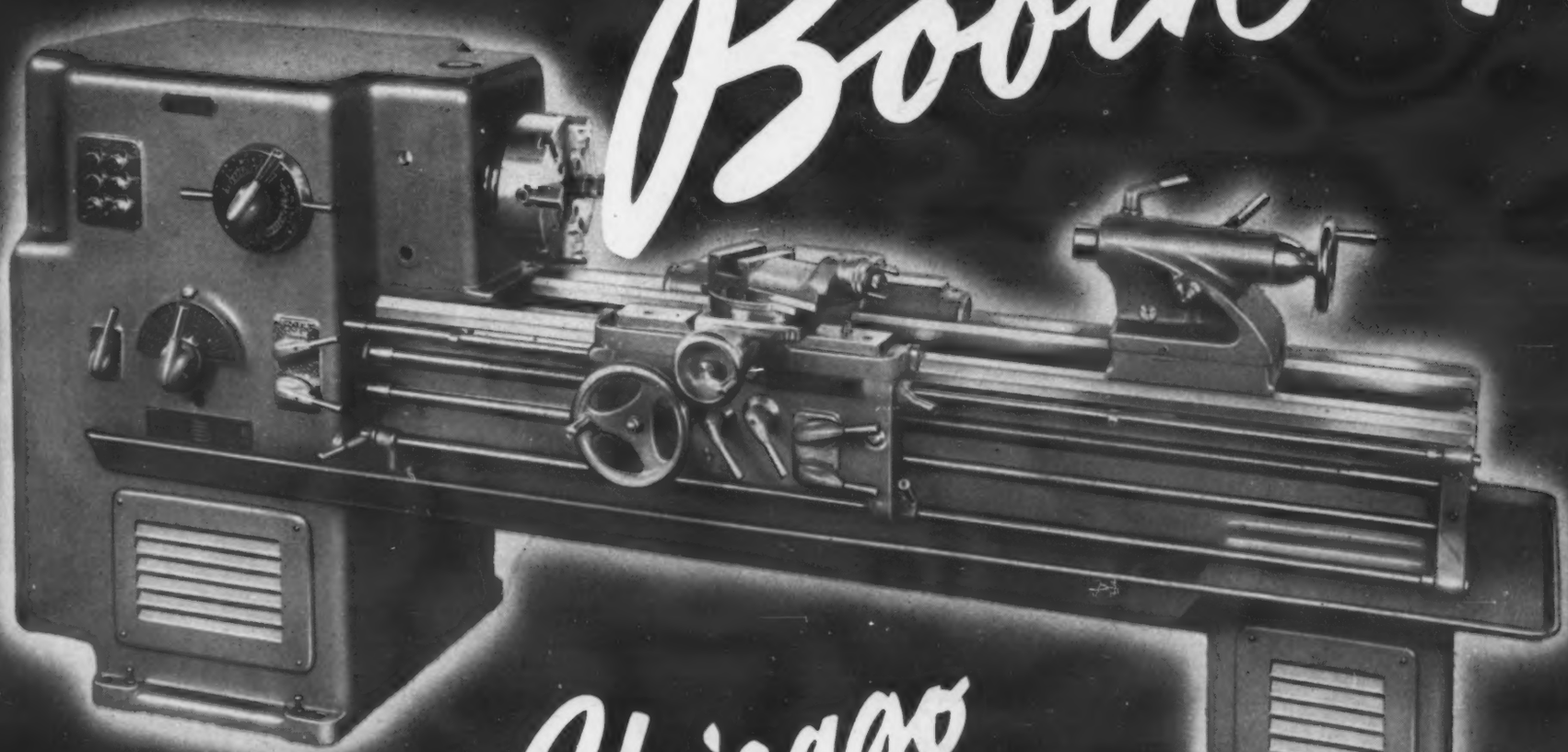
CINCINNATI 25, OHIO

MACHINE TOOL DIVISION • 3055 COLERAIN
SPECIAL PRODUCTS DIVISION • 800 EVANS ST.

SEE THIS MACHINE IN OPERATION

SEE THIS MACHINE IN OPERATION
AT THE MACHINE TOOL SHOW IN

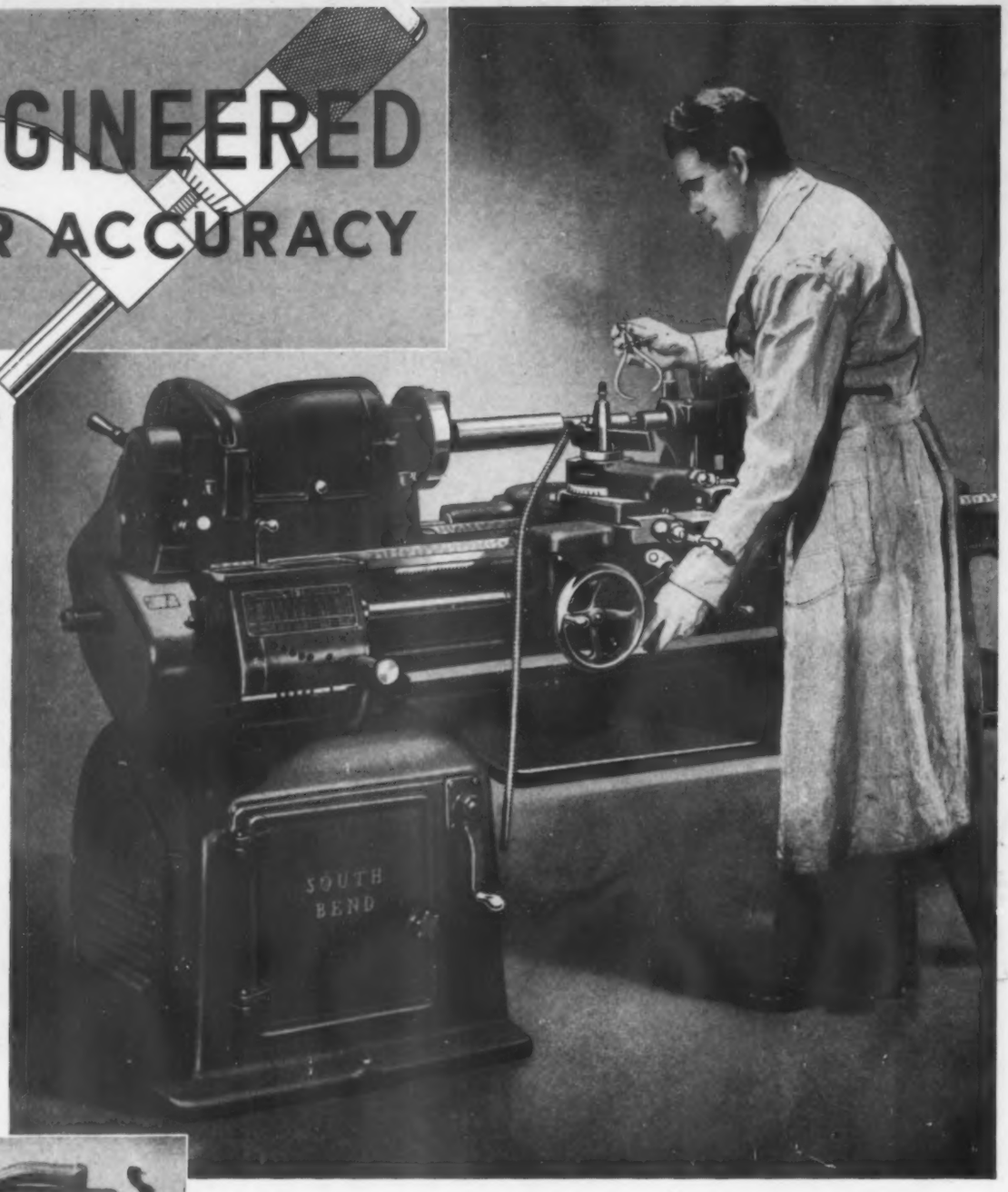
Booth #16



Chicago

SEPTEMBER 17-26, 1947

ENGINEERED FOR ACCURACY



PROMPT DELIVERY
Quick delivery from distributors' stocks or from factory.

PRICES
Average price increase over prewar level less than 15%.

TIME PAYMENTS
Factory Time Payment Plan. 25% down, 12 months to pay. Moderate finance charge.

14-1/2" x 5' South Bend Quick Change Gear Lathe. Price, less electrical equipment and chip pan, f. o. b. factory,
$1309.00

BROADEN THE SCOPE OF YOUR LATHES
South Bend Attachments and Accessories simplify and speed tooling, often save delay and expense of making special fixtures. Shown above is the Handlever Draw-in Collet Attachment. Write for illustrated Catalog No. 77 which shows all South Bend Attachments and Accessories.

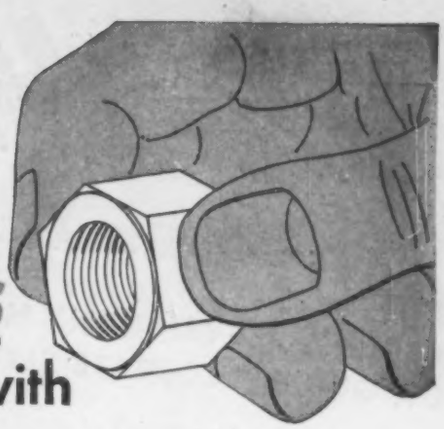
South Bend Lathes are engineered to meet exacting needs for precision accuracy in all types of industries, and to maintain their accuracy year after year, even under strenuous production conditions. Accuracy and long life are built into South Bend Lathes as carefully and surely as they are built into fine timepieces. Correct design based on nearly forty years of research and experience, quality materials specially selected for specific needs, expert craftsmanship, strict inspection through all phases of production and assembly, and thorough testing to rigid working tolerances before shipment, guarantee dependable performance in laboratory, toolroom, production shop, and maintenance department.

South Bend Quick Change Gear Lathes and Toolroom Lathes are made with 9", 10", 13", 14½", and 16" swings, and bed lengths to 12'. Turret Lathes are made with collet capacities to 1". Write today for free 68-page catalog No. 100-F which illustrates all sizes and models, gives detailed specifications, and shows all attachments and accessories.

BUILDING BETTER LATHES SINCE 1906

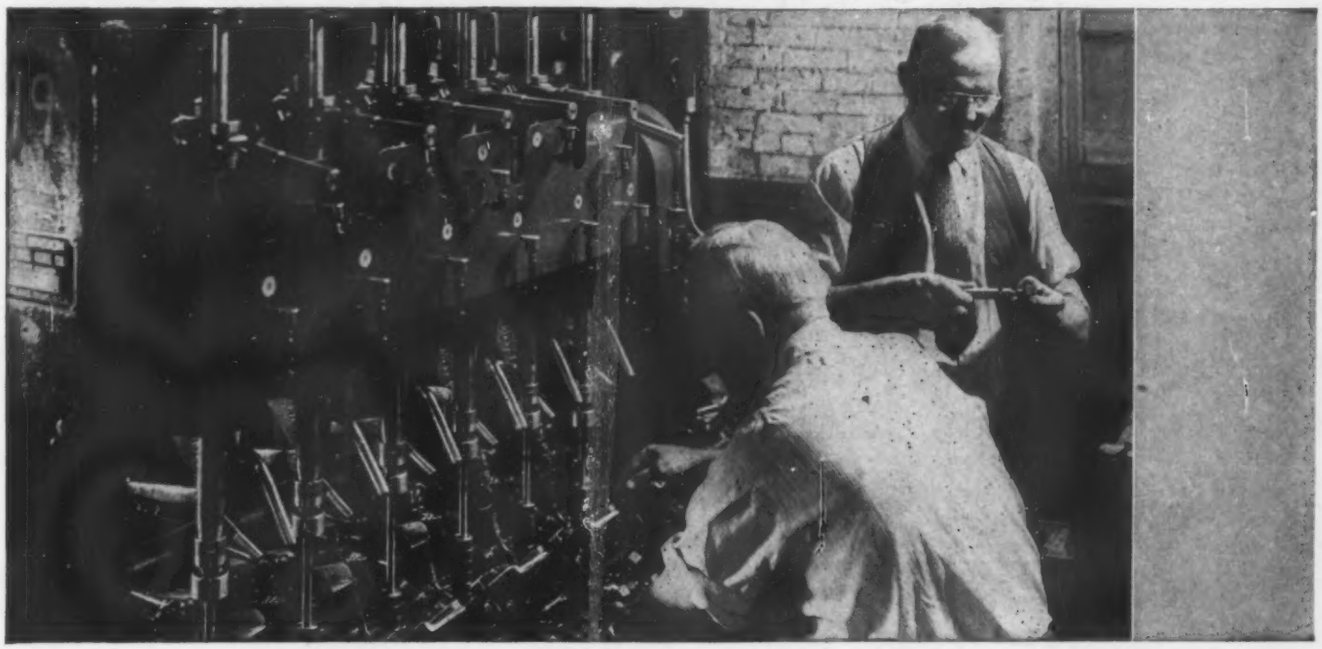
SOUTH BEND LATHE WORKS

419 EAST MADISON STREET • • SOUTH BEND 22, INDIANA



"We get better threads and save a washing operation with Gulf Cut-Aid"

says this Foreman



The Foreman is checking thread finish and size of a ¾-inch Hex nut tapped on this machine. Steel is X1112, free machining Bessemer Screw stock. (Photo courtesy of Corbin Screw Division, American Hardware Company, New Britain, Conn.)

"WE greatly improved the performance of our nut tappers by the use of Gulf Cut-Aid," says this Foreman. "We not only eliminated a washing operation — we're getting a better finish on the threads, and longer tap life."

Though it is generally recommended for machining nonferrous metals, scores of shops report that Gulf Cut-Aid is excellent for tapping low carbon steel nuts.

Call in a Gulf Lubrication Engineer today and let him help you find opportunities for greater production at lower cost through the use of Gulf quality cutting oils. Write, wire, or phone your nearest Gulf office.

Gulf Oil Corporation · Gulf Refining Company

Division Sales Offices:

Boston · New York · Philadelphia · Pittsburgh · Atlanta
New Orleans · Houston · Louisville · Toledo

Gulf Quality Cutting Oils

- Gulf Lasupar Cutting Oils A, B, and C
- Gulf Electro Cutting Oils A, B, and C
- Gulf M-L Cutting Oils A, B, and C
- Gulf Cut-Aid
- Gulf Cutx B
- Gulf L. S. Cutting Base A and B
- Gulf Soluble Cutting Oil A

GULF INDUSTRIAL LUBRICATION

COUNT ON THESE No. 000 FEATURES

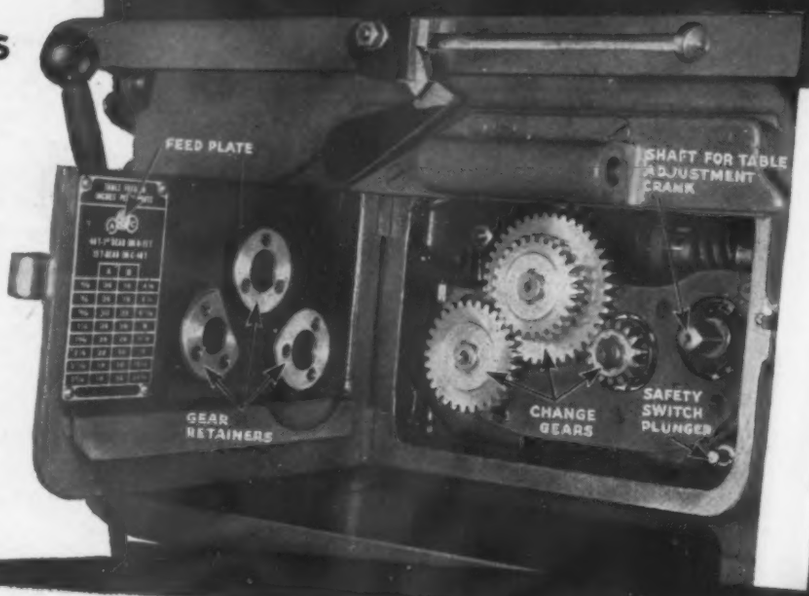
1

SIMPLE TABLE MECHANISMS FOR QUICK, ACCURATE SET-UPS

Pick-off Gears make the selection of proper feed rates easy and fast. Provide a choice of 16 rates of cutting feed, 9/16" to 24 3/8" per minute.

Hand Adjustment of table easily made by hand-crank with fast travel or cutting feed engaged. Point of table reversal is visually indicated at end of table cam — simplifying table adjustment.

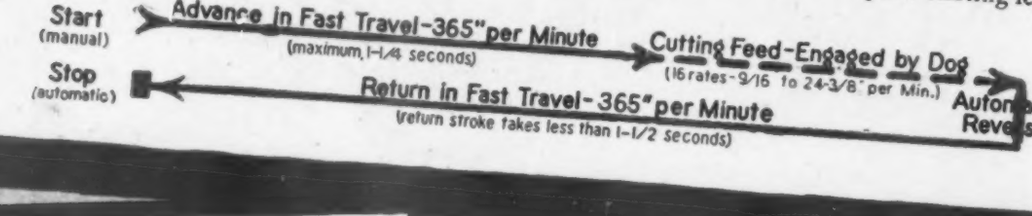
Single Table Dog is quickly adjusted in its T-slot — engages cutting feed within accuracy of 1/16" — reducing non-cutting time to a minimum. Table reverses within .002" at end of any desired cutting feed length from 3/8" to 5 1/2".



2

FAST AUTOMATIC MILLING CYCLE

Reduces non-cutting time to a minimum. Operator merely loads work . . . pulls starting lever . . . unloads finished piece.


Start (manual)
Advance in Fast Travel-365" per Minute
(maximum, 1-1/4 seconds)
Cutting Feed-Engaged by Dog
(16 rates-9/16 to 24-3/8" per Min.)
Stop (automatic)
Return in Fast Travel-365" per Minute
(return stroke takes less than 1-1/2 seconds)
Automatic Reverse

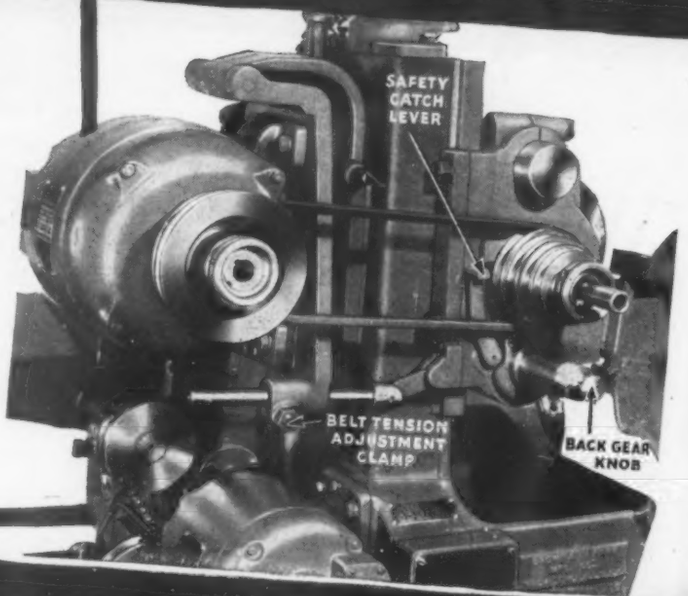
3

RAPID SELECTION OF SPEED AND POSITIONING OF CUTTER

Easy-to-change, V-belt drive and 4-step cone pulleys provide 16 spindle speeds in either of two ranges — 105 to 2340 R.P.M. or 161 to 3540 R.P.M. Upper half of range is V-belt driven (no gear contacts). Lower half is driven by V-belt and back gears.

Wide range permits milling a variety of materials, using cutters down to the smallest end mills.

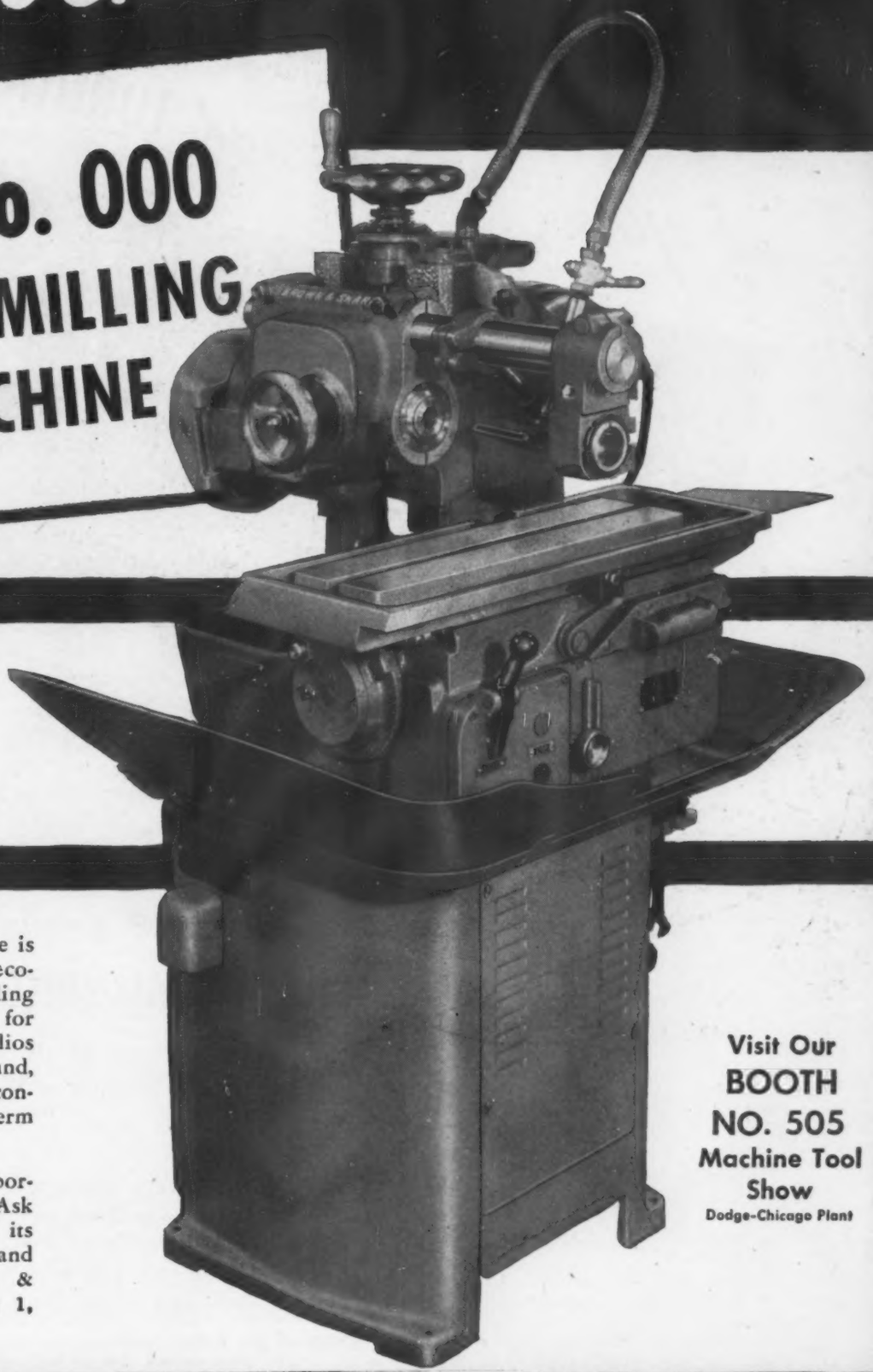
Conveniently located transverse and vertical adjustments provided at front of machine.



BROWN &

FOR PROFITABLE PRODUCTION OF SMALL PARTS

The No. 000 PLAIN MILLING MACHINE



Single lever operating control and automatic milling cycle make this machine simple and easy to operate.

This Brown & Sharpe Machine is designed specifically for the economical, rapid production milling of small pieces, such as parts for sewing machines, firearms, radios and business machines. Its sound, modern design and accurate construction assure the long-term safety of your investment.

Investigate its time-saving, labor-saving production possibilities. Ask for specifications. Look over its carefully-engineered design and construction details. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

Visit Our BOOTH NO. 505 Machine Tool Show
Dodge-Chicago Plant

SHARPE

B·S

Specify MO-MAX HIGH SPEED STEELS *for all of your* CUTTING *and* TURNING TOOLS

Because only MO-MAX

GIVES YOU *ALL* THESE ADVANTAGES...

1. MO-MAX has superior cutting qualities.
2. The machinability of MO-MAX is unexcelled.
3. MO-MAX is economical. Its specific gravity is about 8% less than that of 18% tungsten steel.
4. MO-MAX is available in a standardized composition; also in cobalt and high vanadium varieties for special high speed steel requirements.
5. For 14 years MO-MAX has demonstrated its superiority in all types of cutting tools.

Learn all the facts! **Send for your copy of the MO-MAX Handbook, sixth edition. Get the full story about this remarkable steel, including easy-to-follow instructions on heat treating.**

THE CLEVELAND TWIST DRILL COMPANY

1244 East 49th Street • Cleveland 14, Ohio

Buyer's Guide to Brands of MO-MAX

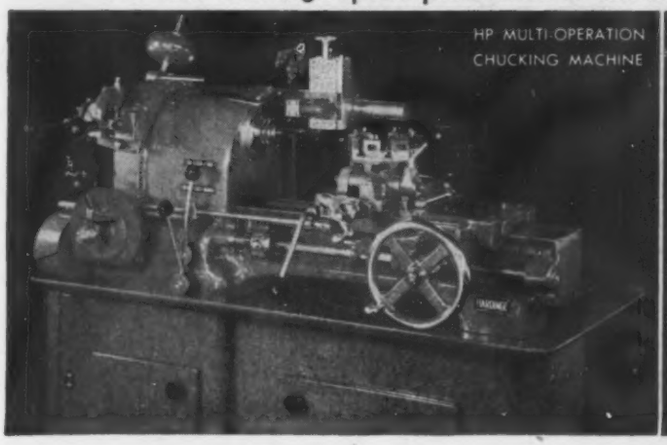
"LMW"	Allegheny Ludlum Steel Corporation
"MOHICAN"	Atlas Steels Limited
"BETHLEHEM HM"	Bethlehem Steel Company
"MO-CUT"	Braeburn Alloy Steel Corporation
"STAR MAX"	Carpenter Steel Company
"MOLITE M-1"	Columbia Tool Steel Company
"REX T-MO"	Crucible Steel Company of America
"01-MOL"	Henry Disston & Sons, Inc.
"HI-MO"	Firth-Sterling Steel Company
"REX T-MO"	Halcomb Steel Company
"MOGUL"	Jessop Steel Company
"TATMO"	Latrobe Electric Steel Company
"MIDMAX"	The Midvale Company
"S. T. M."	Simonds Saw & Steel Company
"MO-TUNG"	Universal-Cyclops Steel Corporation
"V-M-2"	Vanadium-Alloys Steel Company
"VUL-MO"	Vulcan Crucible Steel Company

HARDINGE
ELMIRA, N.Y.

High Speed Precision Machines

FOR PRODUCTION WORK

For Low Cost high speed production to extremely close tolerance and finish specifications.

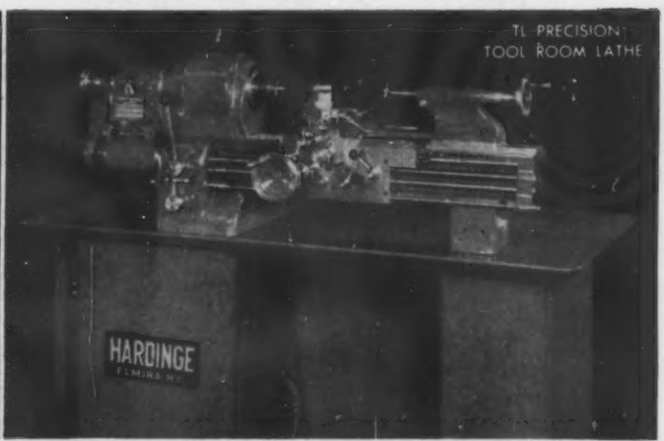

HP MULTI-OPERATION CHUCKING MACHINE

DSM59 SECOND OPERATION MACHINE

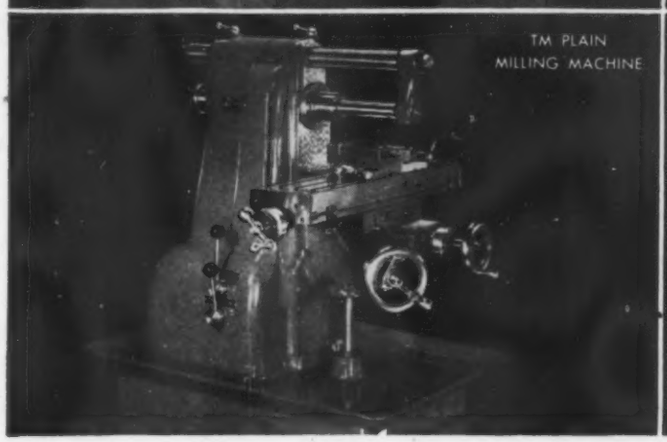
FOR TOOL ROOMS, LABORATORIES AND DEVELOPMENT DEPARTMENTS

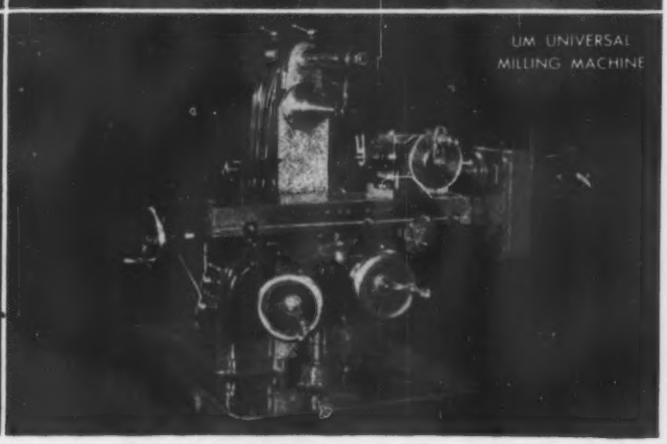
Extreme accuracy and ease of operation for improving your tool room work and to lower cost.

DV59 PRECISION LATHE



TL PRECISION TOOL ROOM LATHE


TM PLAIN MILLING MACHINE

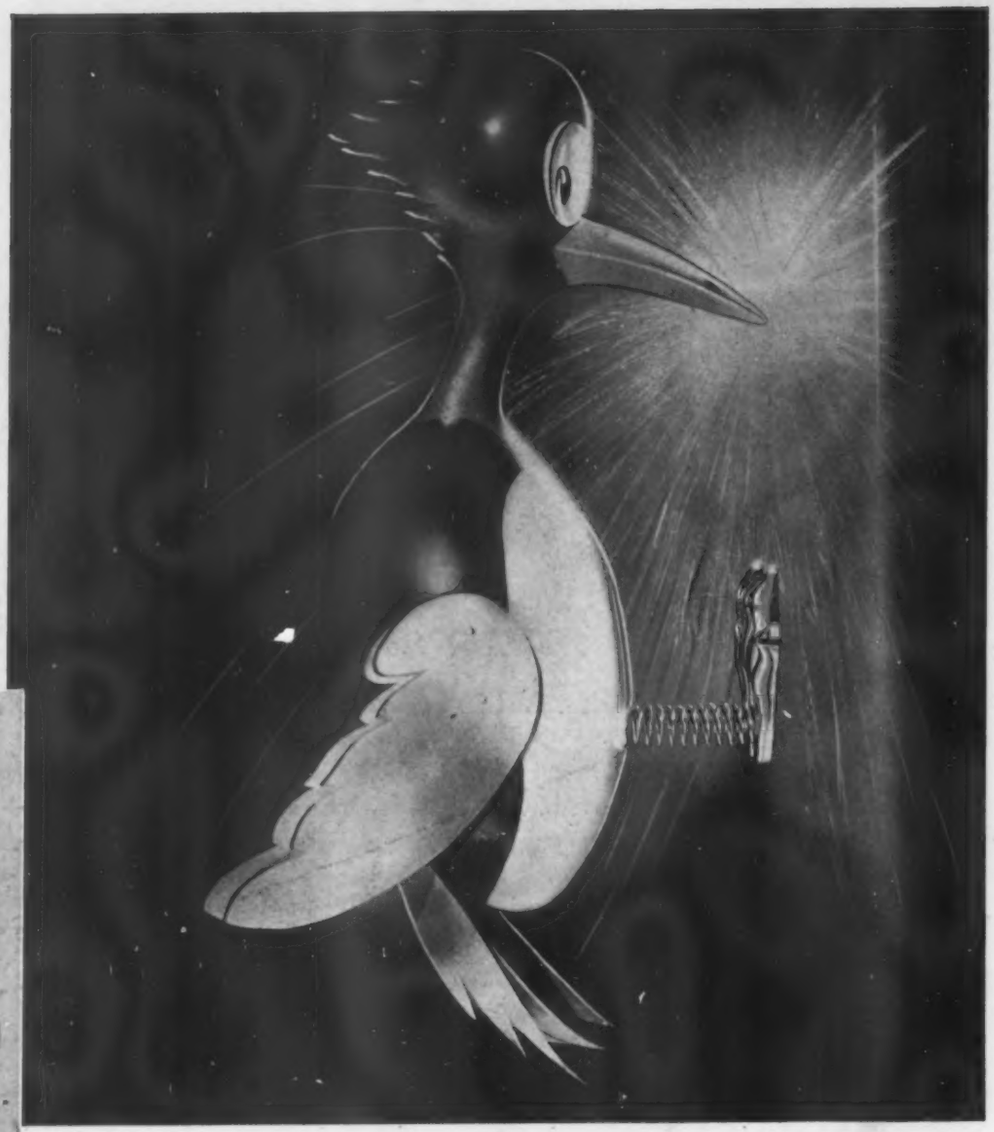

UM UNIVERSAL MILLING MACHINE

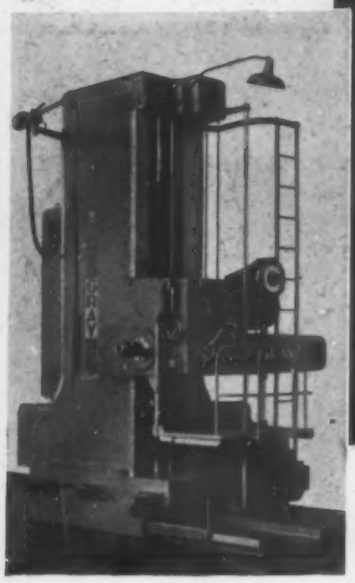
See these machines in operation in Booth No. 45 at the Machine Tool Show September 17-26 at the Dodge-Chicago Plant,

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

what a bird!





GRAY *Electric Woodpecker**

see him at the Machine Tool Show

You will agree that "he's a bird" when you see him set a 25-ton column within a quarter-thousandth of an inch.

This is one of the many exclusive features of Gray Boring, Drilling and Milling Machines.

Write for fully illustrated descriptive Bulletins Nos. 48 and 54.

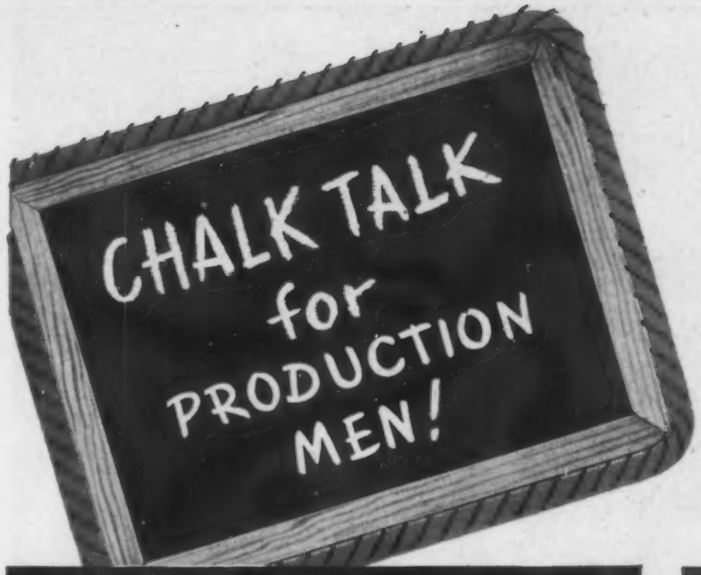
* Protected by Patent 2,378,343 and Patent Pending.

The G.A. **GRAY** *Company*

planers • milling planers
planer type milling machines
horizontal boring machines

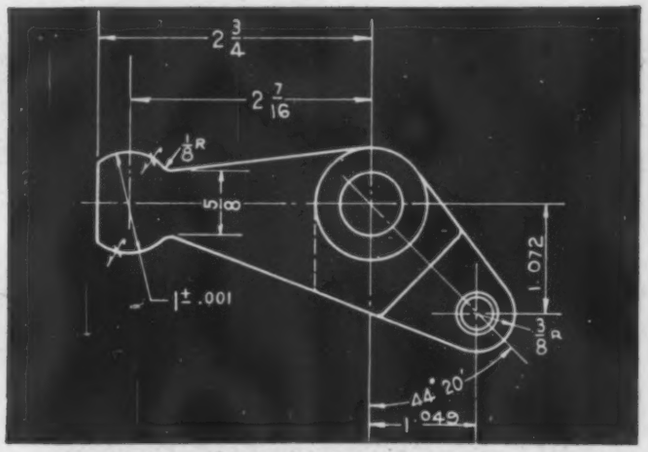
CINCINNATI 7, OHIO, U. S. A.

SOLD IN CANADA BY UPTON, BRADEEN AND JAMES, LTD. • SOLD IN LATIN AMERICA BY MACHINE AFFILIATES

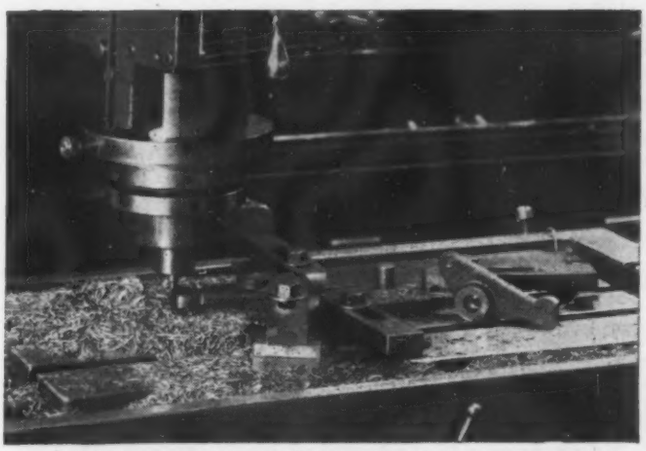


Cut Milling Time on this small part from 3¼ Minutes to 30 Seconds

1 **FAST!** The 1" dia. on the cam end of these malleable iron shifter levers was completely milled (ruff & finish) in 30 sec. each, floor to floor. Initial set-up took only 20 min. Old method of form milling took 3¼ min. Time saved is typical of Model 2D Rotary Head Milling Machine performance.



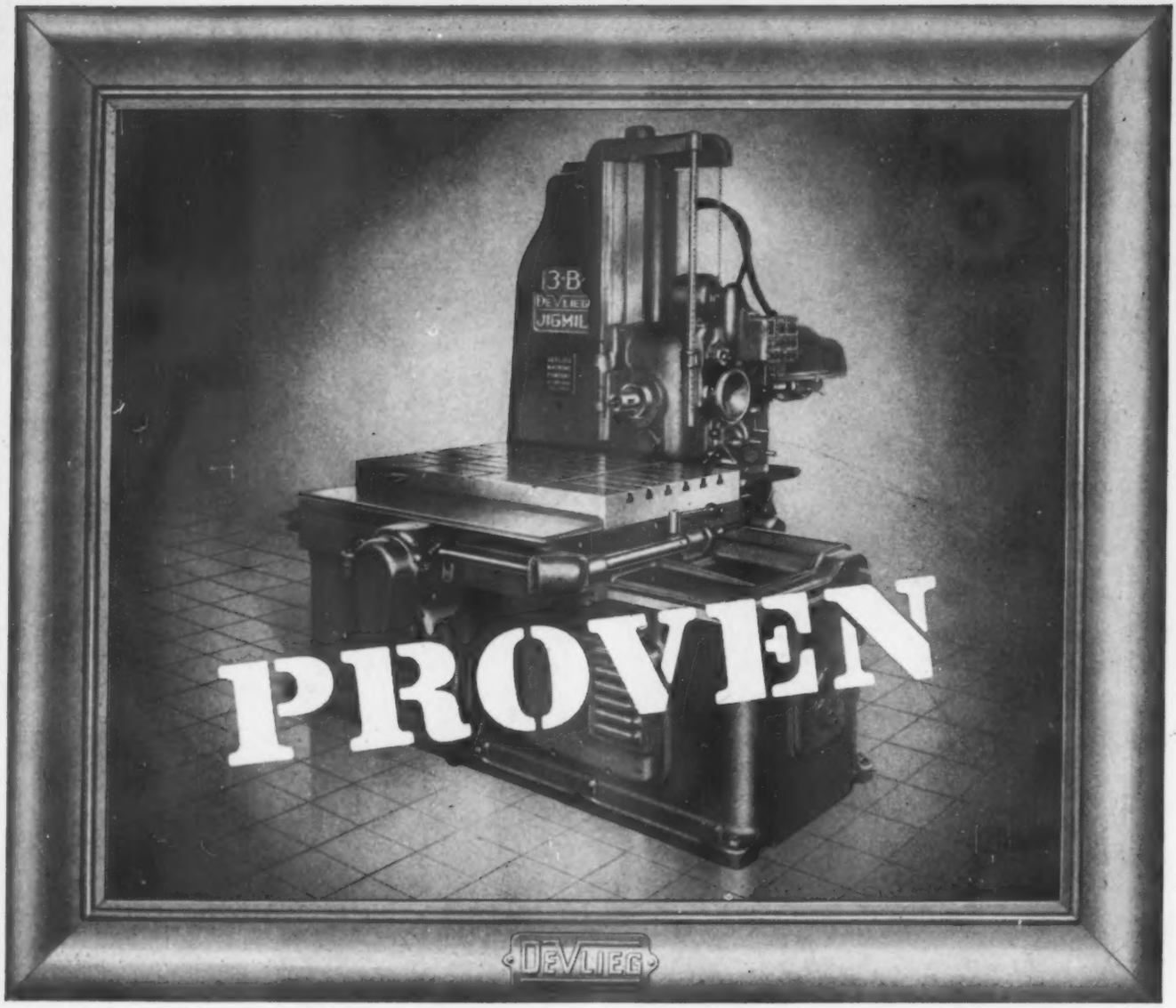
2 **DIRECT!** The simple radius of the cam end of the shifter lever was milled direct. A small end mill was the only tool used. Blueprint was the only guide operator had or needed. Precise mechanical control of the cutter in all angular and radial movements, a unique feature of the machine, did the rest.



3 **ACCURATE!** The single, simple set-up held chance for error to minimum. The built-in precision control and measuring devices for all combinations of cutting movements, angular and radial in both horizontal and vertical planes guaranteed uniform, accurate results.

4 For more facts on how you can get **FAST, DIRECT, ACCURATE** results on other contour milling jobs, or on tool and die work, using the Kearney & Trecker Rotary Head Method, write for bulletin 1002C on the Model 2D Rotary Head Milling Machine.

KEARNEY & TRECKER CORPORATION
MILWAUKEE 14, WISCONSIN



The World's Finest Boring and Milling Machine

THIS new model 3-B JIGMIL has automatic power means to position the spindle from one location to another accurately to within much less than .0001 (one-ten thousandths part of an inch). Thus, extreme laboratory accuracy is conveniently available with ordinary skill that would normally make such precision very high in cost. This, and many other refinements, go further to prove that the JIGMIL Idea is a totally new approach to the problems of precision boring at a new low cost.

DeVLIEG MACHINE COMPANY DEVLIEG JIGMIL **450 FAIR AVE. FERNDALE 20, (Detroit) MICH.**

WHEN YOU NEED..

STRENGTH *and* **TOUGHNESS** *with* **LIGHTNESS**

82,000 psi. ultimate | 15% elongation | 0.101 # / cubic inch

..use an Alcoa Aluminum Forging

These are typical properties for Alcoa 75S-T Aluminum Forgings.

There are eleven other Alcoa forging alloys to give you any combination of mechanical properties that you need.

Alcoa Aluminum Forgings are strong to resist sudden loads and impacts, yet light to reduce dead weight. They are solid and homogeneous all the way through. Contain no blowholes and slag inclusions, will machine uniformly throughout.

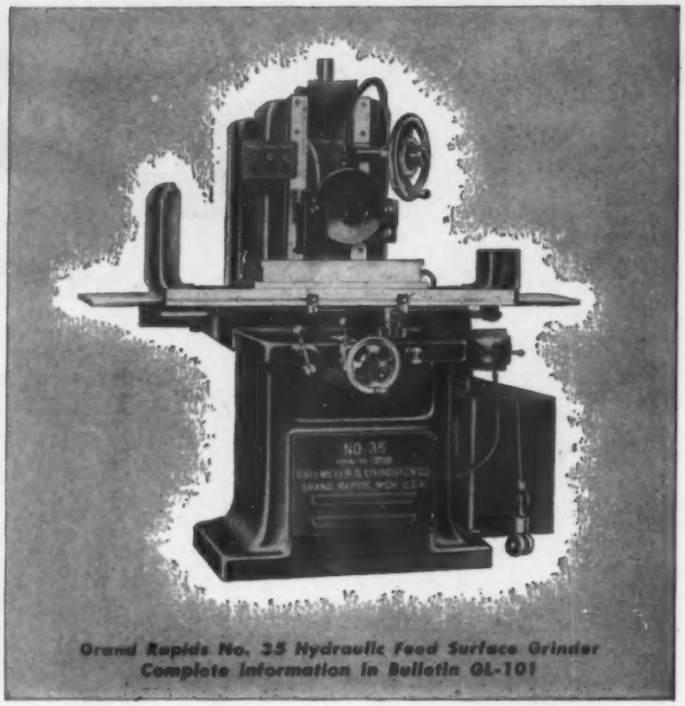
Hammers are available TODAY to turn out lightweight, strong aluminum forgings in all sizes from giants to miniatures. We'll be glad to help you design your parts as Alcoa Aluminum Forgings. ALUMINUM COMPANY OF AMERICA, 2107 Gulf Bldg., Pittsburgh 19, Pa. Sales offices in leading cities.

MORE people want MORE aluminum for MORE uses than ever

ALCOA ALUMINUM

IN EVERY COMMERCIAL FORM

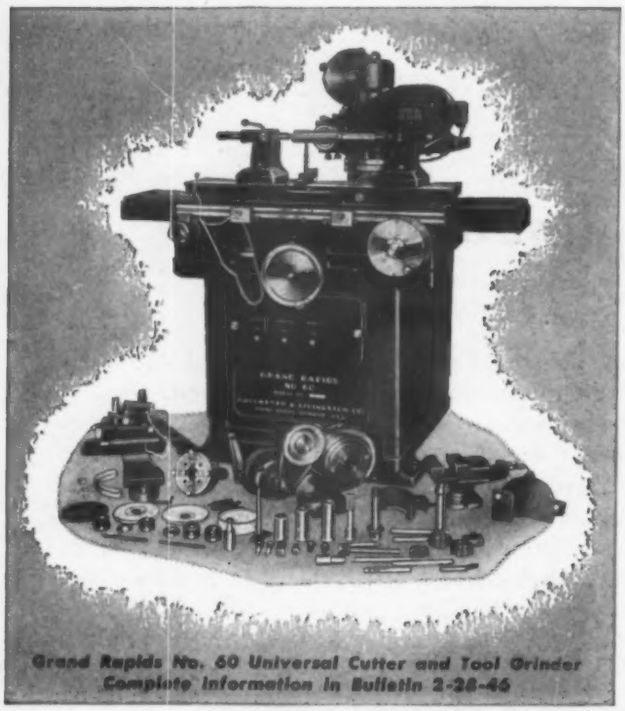
Every working day thousands of plants all over the world prove the....



Grand Rapids No. 35 Hydraulic Feed Surface Grinder
Complete information in Bulletin GL-101

Unqualified Excellence

of GRAND RAPIDS GRINDERS



Grand Rapids No. 60 Universal Cutter and Tool Grinder
Complete information in Bulletin 2-28-46

here's why • Every Grand Rapids Grinder, large or small, has every essential feature for fast, efficient, low-cost production. Refinements in construction details such as the massive castings, heavy, rigid spindles, separate spindle motors, assure years and years of trouble-free life. Grand Rapids No. 60 Universal Cutter and Tool Grinder and No. 35 Grand Rapids Hydraulic Feed Surface Grinder will handle all of your tool room jobs from grinding of dies to sharpening all types of milling cutters, reamers and similar tools.

What "GRAND RAPIDS" quality means:

Gallmeyer & Livingston cast their own close-grained gray iron, machine to micrometric tolerances, and precision-assemble grinding machinery of unsurpassed performance. *Grand Rapids* means top quality in grinding machinery.

GRAND RAPIDS
MANUFACTURED BY
GALLMEYER & LIVINGSTON CO.
GRAND RAPIDS, MICHIGAN, U.S.A.

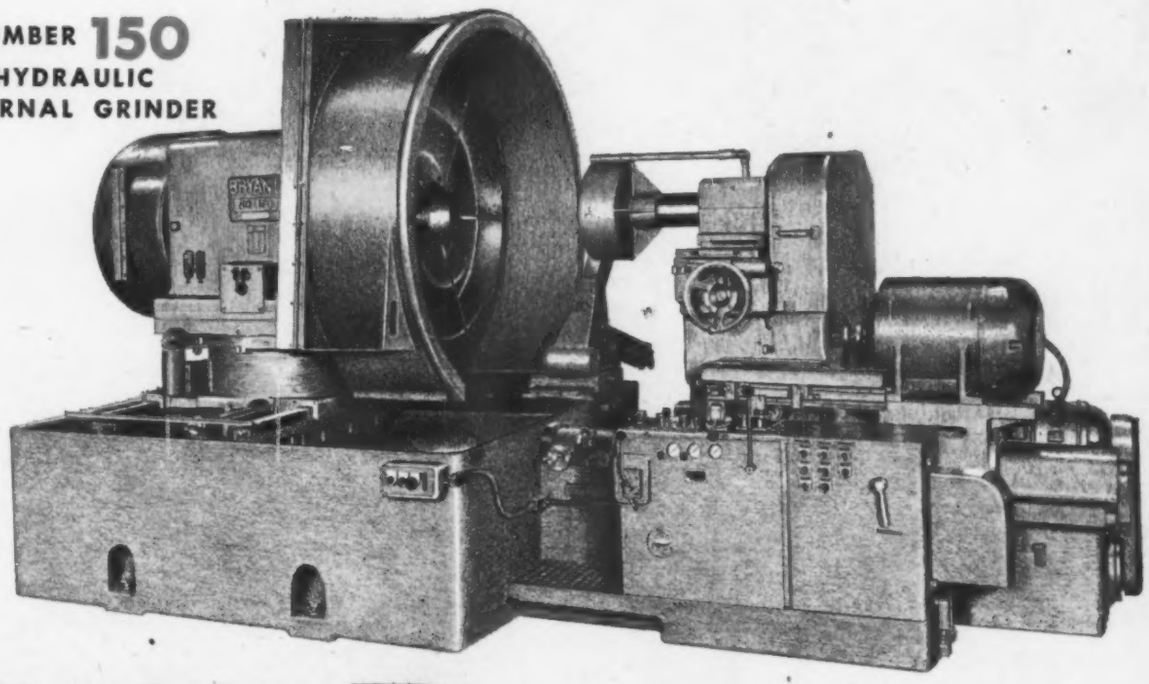
GALLMEYER & LIVINGSTON COMPANY, 066 STRAIGHT AVENUE, S.W., GRAND RAPIDS 4, MICHIGAN

Behemoth Bigness *with a "Tiffany Touch"!*

The Bryant No. 150 vastly increases the scope of precision internal grinding. With this rugged machine, you may now grind parts up to 60 inches in diameter with a maximum hole depth of 16 inches. In spite of its size, the No. 150 is a precision production machine with "finger-tip" control. Positive alignment is assured by the use of the well-known Bryant 3-point wheel slide suspension. A preloaded anti-friction cross slide gives smooth cross-feed—either by hand or power. A hydraulically operated wheel slide simplifies gaging and loading and unloading of large work pieces.

In a single chucking, the new No. 150 can grind a bore, or a bore and face—the bore may be either straight or tapered. Hardened and ground slides give the work head 24 inch movement axially and crosswise to simplify finishing long work or large diameter work. Outside diameters, or outside diameters and faces can also be finished in one chucking. Spacer blocks can be inserted between the cross-feed screw and the cross slide to obtain a second setting for a counterbore or face grinding operation. A copy of Bryant No. 150 catalog sheet, giving full details, is yours for the asking.

NUMBER 150
HYDRAULIC
INTERNAL GRINDER



Send for the Man from

BRYANT CHUCKING GRINDER CO.

SPRINGFIELD, VERMONT, U. S. A.

BRYANT

RIVETT

WHEN
COSTS AND QUALITY COUNT
THE *New* 918S TURRET LATHE

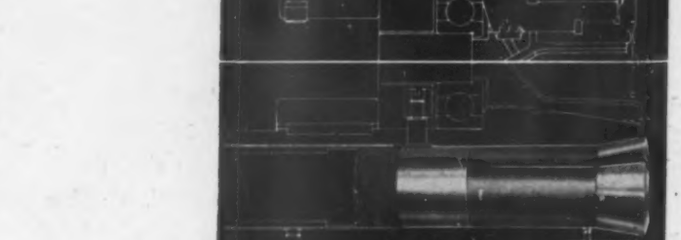
If you machine small and medium sized parts from bar stock or on second operations — look to this new Rivett Turret Lathe. It is designed to buy its way into your plant with cost savings and quality control.

The 918S Turret Lathe cuts the initial cost of investment by taking work from larger machines. It follows by reducing the "dead time" of set-up and spoilage on every job. Then it really pays with lowered time on every piece. How? — With the right spindle speed for efficient tooling, with quick means for chucking work, with properly grouped control levers and by reducing operator fatigue.

Features designed into the 918S Turret Lathe to guard quality include a rigidly mounted precision ball bearing spindle, precise tool indexing, hardened and ground steel bedways, vibration-free drive and mounting.

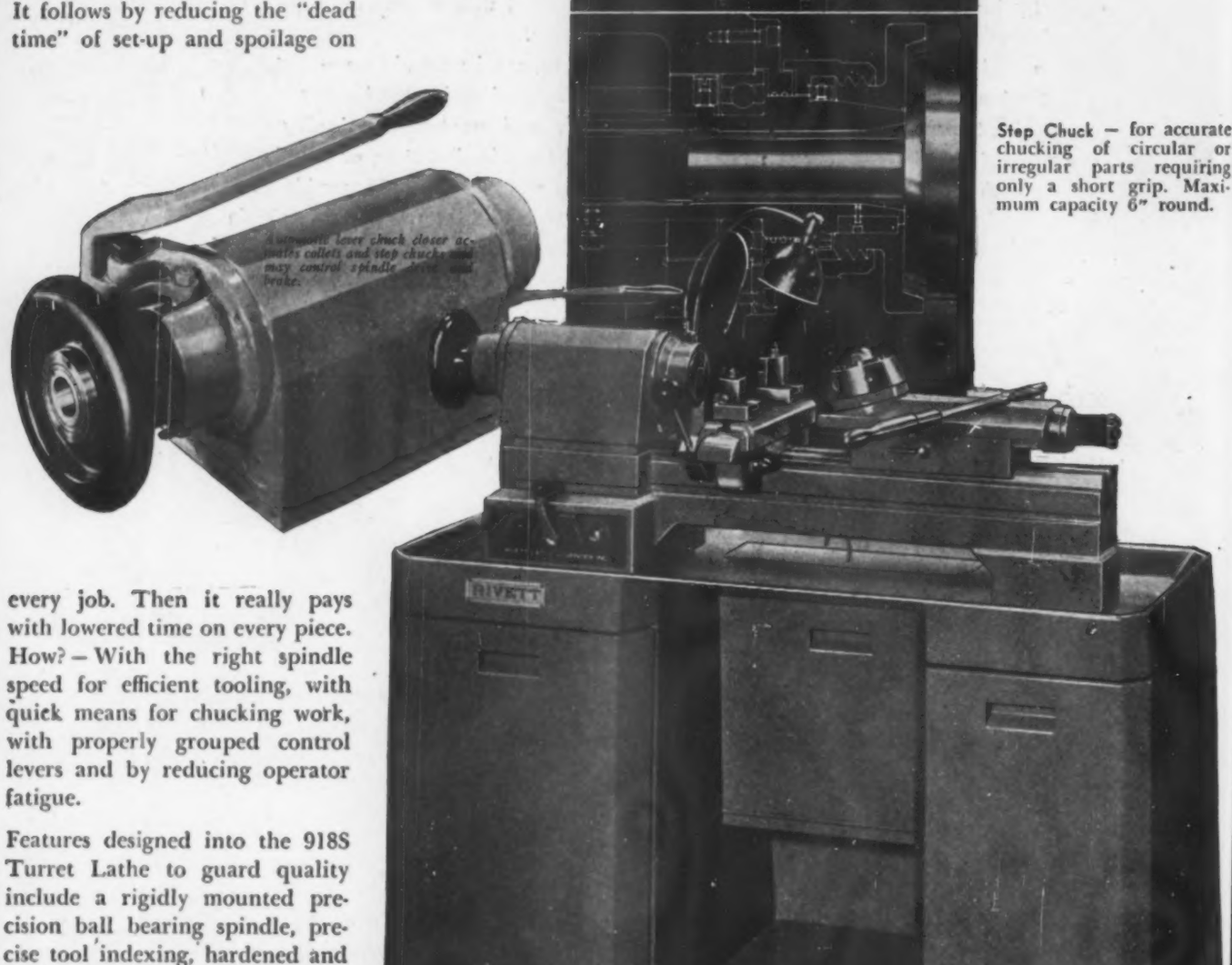
Write for Bulletin 918-ST

Stationary Collet — closes without lateral movement to maintain perfect lengths on bar stock. Maximum capacity 7/8" round.



Draw-In Collet — new design holds work truer with greater gripping power. Maximum capacity 1 1/8" round.

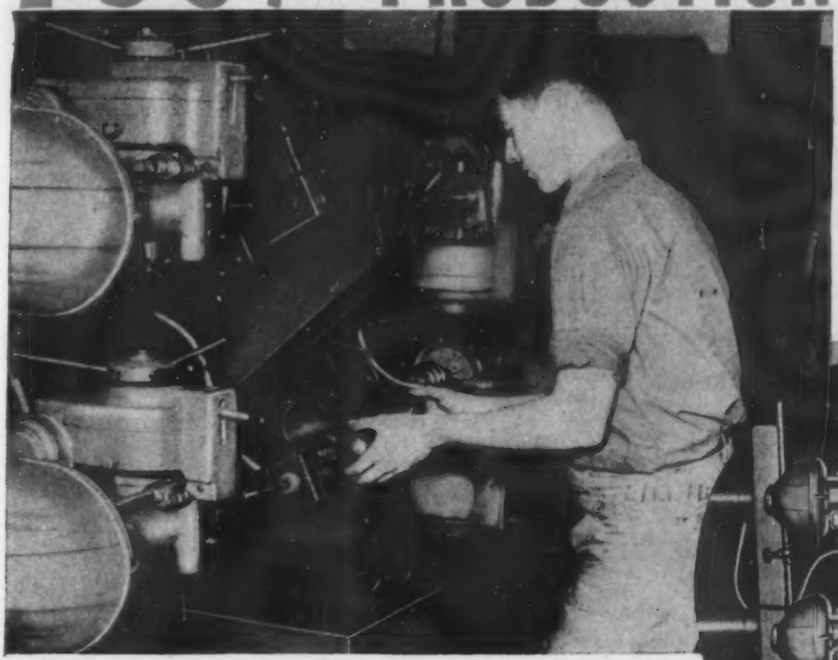
Step Chuck — for accurate chucking of circular or irregular parts requiring only a short grip. Maximum capacity 6" round.

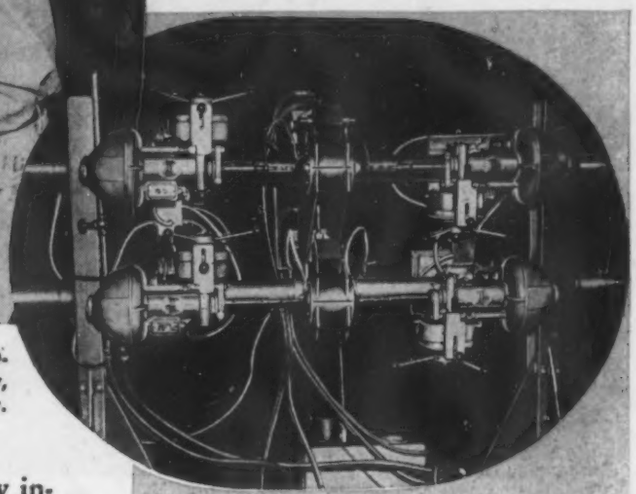


RIVETT LATHE & GRINDER, Inc.

BRIGHTON · BOSTON · MASS. · U.S.A.

700% PRODUCTION INCREASE... with STANDARD WALKER-TURNER DRILL HEADS



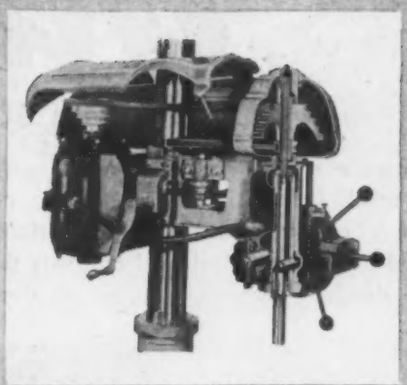


Eight separate operations are consolidated into one by using four STANDARD Walker-Turner 20" Power Feed Drill Heads, mounted horizontally, to drill both ends of two double end tube closures simultaneously.

"We have been amazed at the economies obtained by incorporating standard Walker-Turner 20" Power Feed Drill Heads in a special set-up which we designed," says Mr. A. G. Stahl of the Engineering Department of the Tube Manifold Corporation, Buffalo, N. Y.

"In drilling double end tube closures, eight operations were consolidated into one. With a single operator, production has been increased 700%.

"We prefer Walker-Turner Drill Presses because of the added advantages of the ten spline spindle with no play, the six inch spindle travel and wide speed ranges. The low initial cost of these machines and their adaptability for special set-ups have solved many of our production cost problems."



D1100X—20" Power Feed Drill Head Unit. Five standard spindle speeds, 400 to 2600 r.p.m. with 1740 r.p.m. motor.
*Price, less motor $216.00

TWENTY-FIFTH YEAR
1922 1947

Write for catalogue with complete specifications

*F.O.B. Plainfield — Slightly higher west of the Rockies and in Canada

SOLD ONLY BY AUTHORIZED INDUSTRIAL MACHINERY DISTRIBUTORS 162

walker-Turner COMPANY, Inc. PLAINFIELD, N.J. U.S.A.

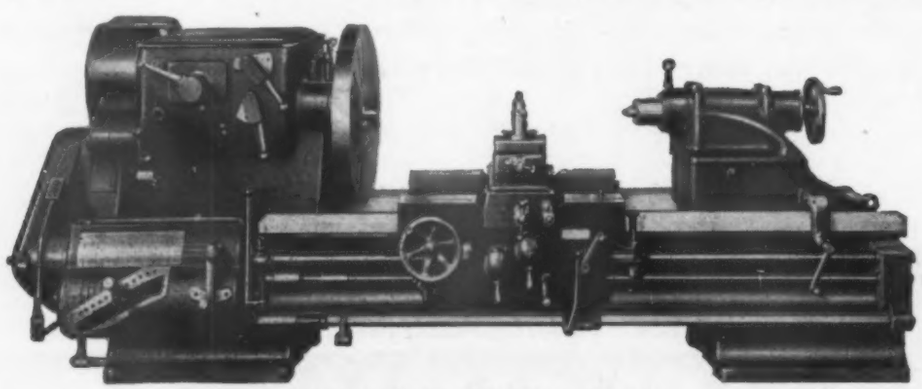
MACHINE TOOLS

DRILL PRESSES - HAND AND POWER FEED • RADIAL DRILLS • RADIAL SAWS
METAL-CUTTING BAND SAWS • POLISHING LATHES • FLEXIBLE SHAFT MACHINES
RADIAL CUT OFF MACHINES FOR METAL • MOTORS • BELT & DISC SURFACERS

Massive—

Springfield 30" Medium Duty Geared Head Lathe

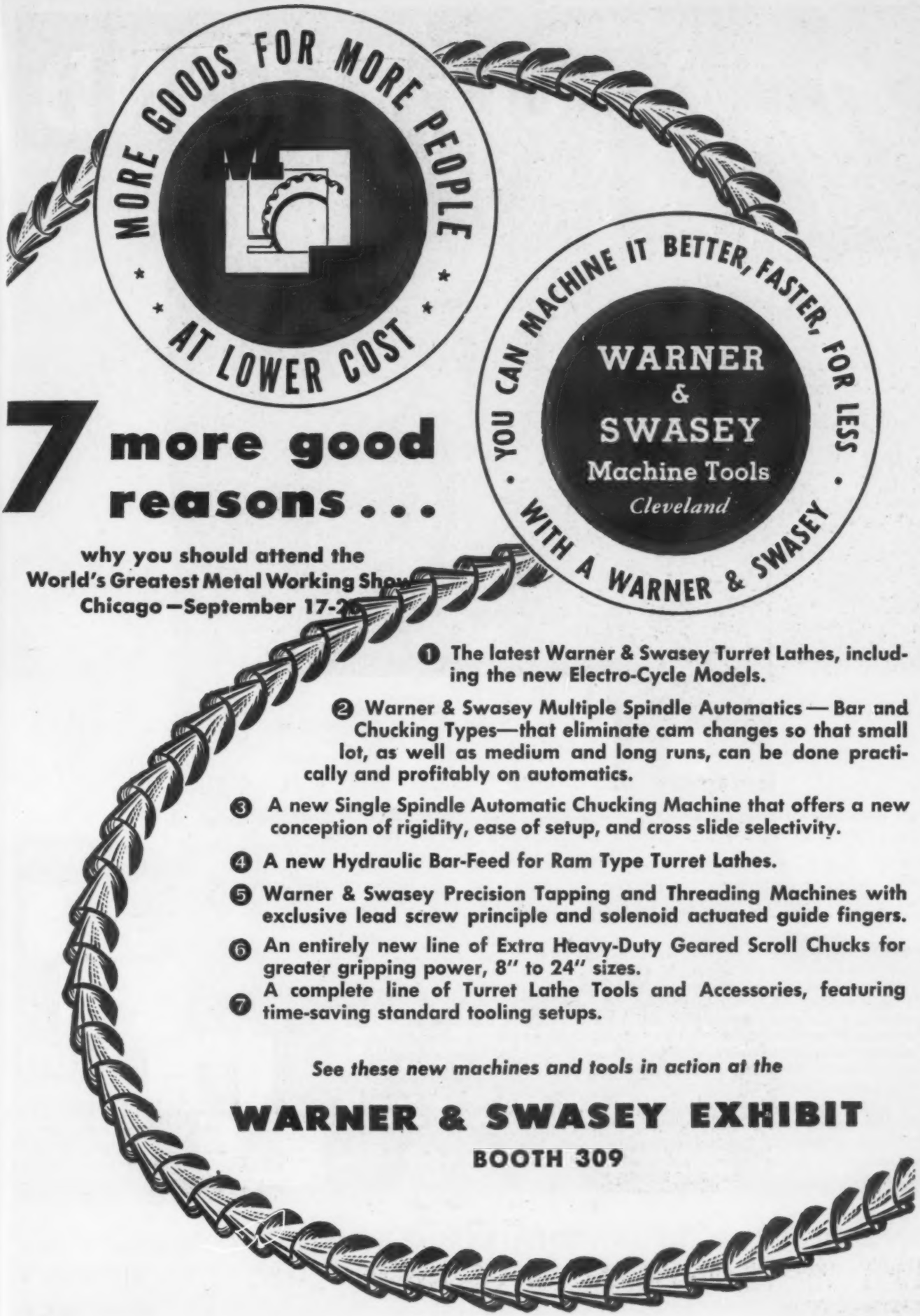
To handle those big jobs *and* the smaller ones choose Springfield Geared Head Lathes. Long, accurate performance is "built in" with the deep well-ribbed bed, with the nickel and chrome steel used and with the powerful massive design. Thirty-six changes of threads and feeds are available in the 30" lathe. Reverse gears are arranged to produce right- or left-hand threads without the use of wrenches and with a minimum of effort. Lead screws are tested to .001 inch to the foot and are used only for threads. A feed rod is supplied for all feeds.



When in need of a 30" lathe, write us for Bulletin 165.

THE SPRINGFIELD MACHINE TOOL COMPANY

SPRINGFIELD **OHIO, U.S.A.**



7 more good reasons . . .

why you should attend the World's Greatest Metal Working Show Chicago—September 17-2

1. **The latest Warner & Swasey Turret Lathes, including the new Electro-Cycle Models.**
2. **Warner & Swasey Multiple Spindle Automatics — Bar and Chucking Types—that eliminate cam changes so that small lot, as well as medium and long runs, can be done practically and profitably on automatics.**
3. **A new Single Spindle Automatic Chucking Machine that offers a new conception of rigidity, ease of setup, and cross slide selectivity.**
4. **A new Hydraulic Bar-Feed for Ram Type Turret Lathes.**
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7. **A complete line of Turret Lathe Tools and Accessories, featuring time-saving standard tooling setups.**

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WARNER & SWASEY EXHIBIT

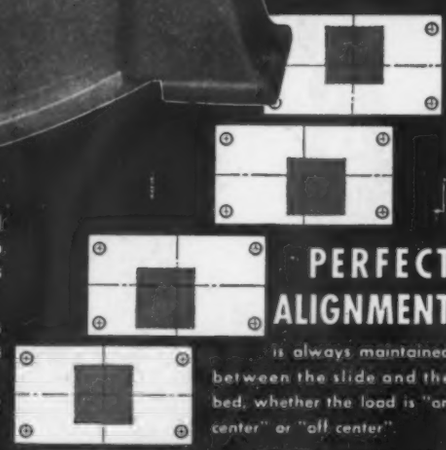
BOOTH 309

Modern CLEVELAND

THE great many changes and improvements which have been, and are being made in Cleveland Power Presses, have not been developed merely for the sake of general appearance but more especially to reduce operating and maintenance costs and to assure greater accuracy, safety and economy in the production of component parts or complete pressed metal products.

The Press illustrated above is typical of our Modern line of Four Point Presses. This Press has an 8" stroke, 6" adjustment, 90" x 136" bed area, operates at 14 strokes per minute and has a capacity of 300 tons.

If you are interested in Modern Presses for modern production, it will pay you to investigate Clevelands.



PERFECT ALIGNMENT

is always maintained between the slide and the bed, whether the load is "on center" or "off center".

Modern Presses **THE CLEVELAND PUNCH & SHEAR WORKS COMPANY** *Cleveland 14, Ohio*

NEW YORK • CHICAGO • DETROIT • PHILADELPHIA • PITTSBURGH

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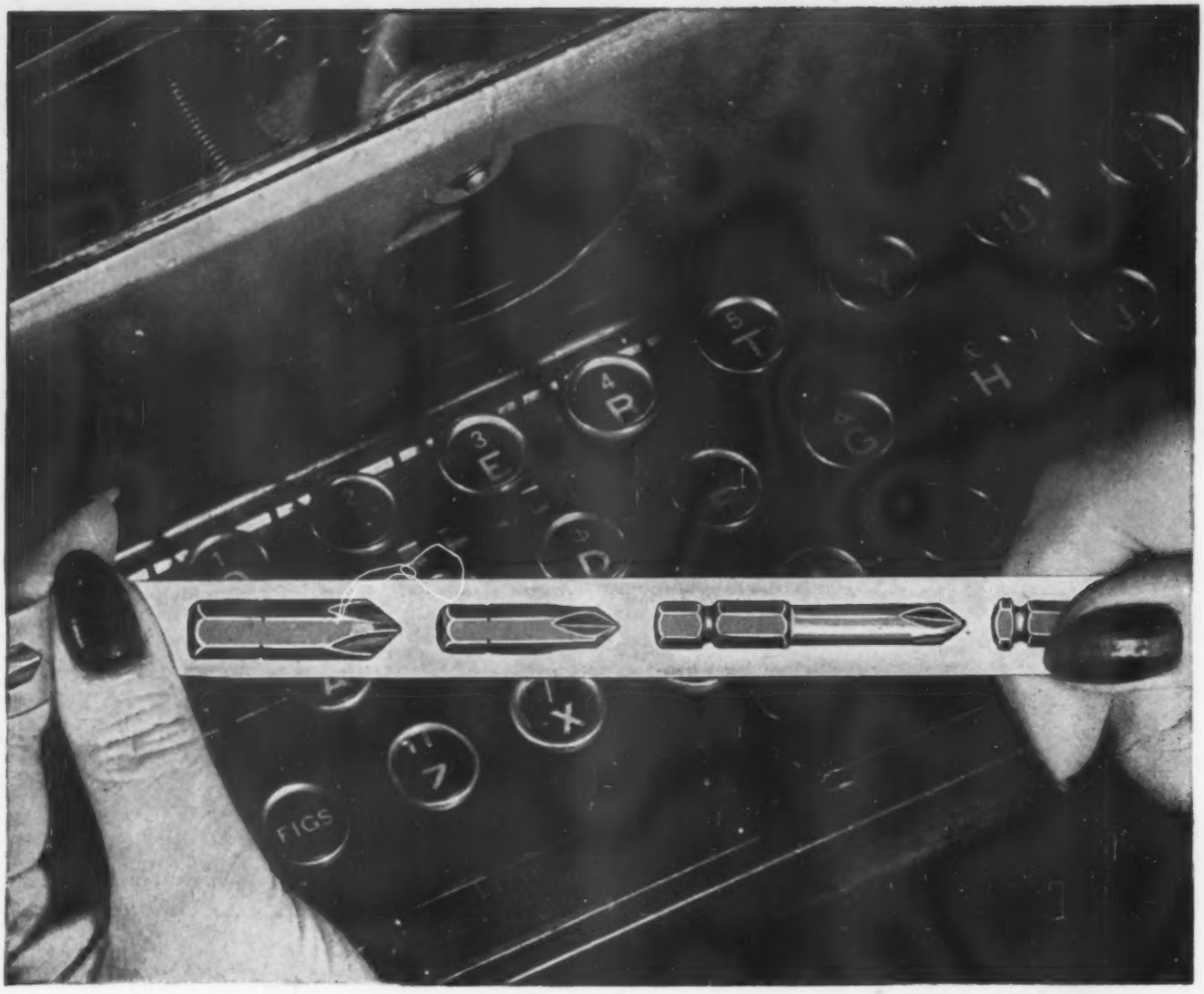
WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF FRACTIONAL HORSEPOWER GEARS



FLASH: NEW ADDITION TO APEX FAMILY

Here's good news for cost-conscious assembly departments: now Apex can furnish power bits (one-piece and insert type) for Frearson Recess Screws —as well as for Phillips, Clutch Head, and Slotted Head Screws.

This new line is furnished in a full range of styles and lengths to fit practically any make of air, electric, or spiral driver—in two hardnesses: standard for regular screws; extra hard for self-tapping screws.

So now, if you use the economical bit holders, you can order the insert tips you need for any of four screw types, discard them as they wear out, keep your bit inventory adequate, and make a small inventory in bits do a bigger-than-ever job.

A catalog for this new line will be available soon. In the meantime, bring your files up to date by writing for our latest catalogs, specifying types of screws you use.

APEX bits

THE APEX MACHINE & TOOL COMPANY, 1035 S. Patterson Blvd., Dayton 2, Ohio

Safety Friction Tapping Chucks • Quick Change and Positive Drive Drill Chucks • Vertical Float Tapping Chucks • Parallel Floating Tool Holders • Power Bits for Phillips, Slotted Head, Frearson and Clutch Head Screws • Hand Drivers for Phillips and Clutch Head Screws • Aircraft and Industrial Universal Joints • Sockets and Universal Joint Socket Wrenches

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MACHINE TOOL SHOW
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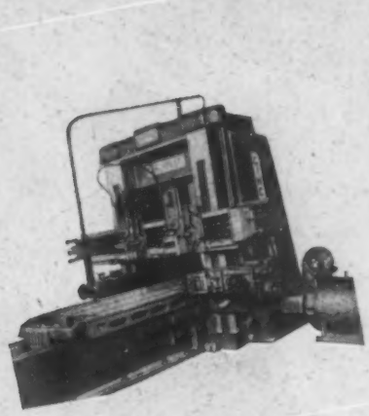
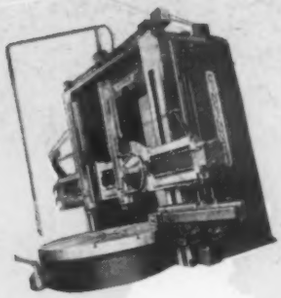
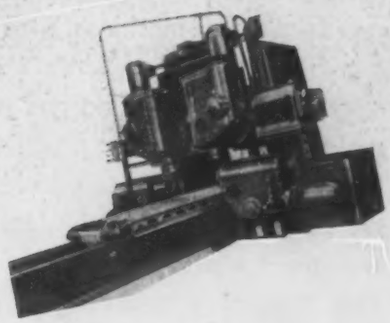
Plane at ??? feet per minute
Mill your ??? electronically on our planer miller
Maintain ??? ??? ??? electronically on our Vertical Boring Mill







CHICAGO ●

MACHINE TOOL SHOW
Dodge Plant - Chicago, Illinois, September 17-26, 1947
Booth Number – 220

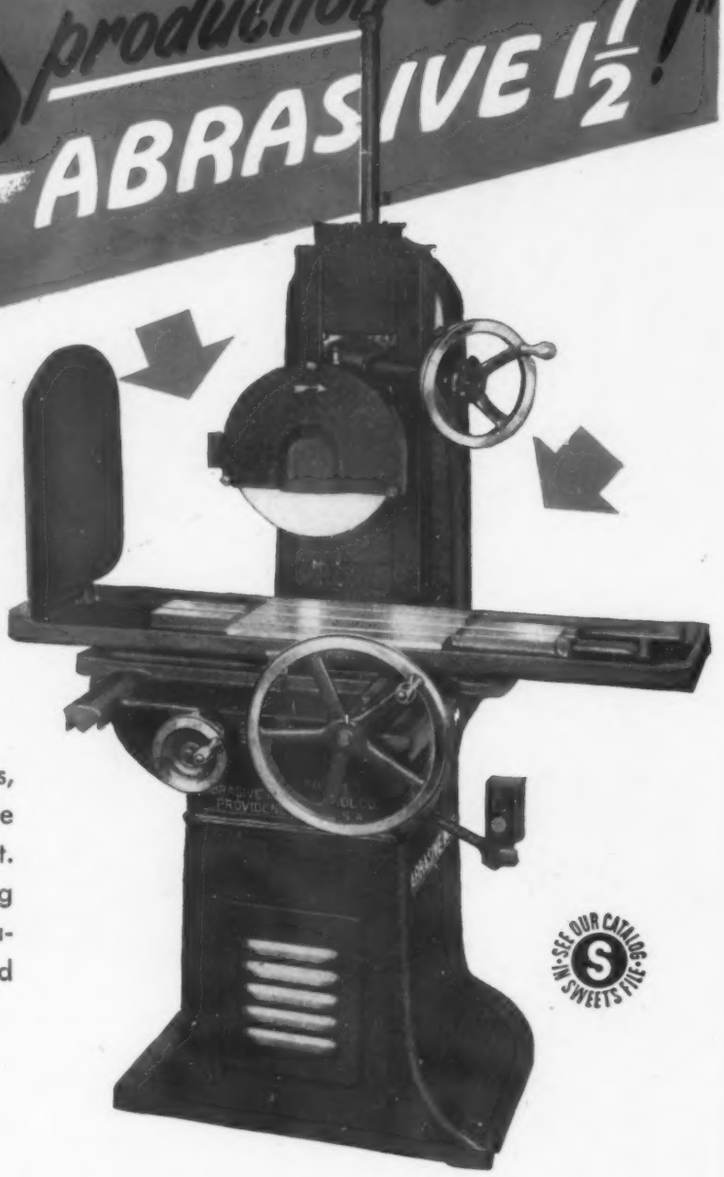
THE CINCINNATI HYPRO PLANER COMPANY

PLANERS · BORING MILLS · PLANER TYPE MILLERS

CINCINNATI 9, OHIO

"ABRASIVE No. 1½ hand-operated surface grinder has saved a lot of money for our shop . . . it completes the average short-run job in almost no time, and handles big work — 10" wide, 15" long and 12" high — that used to tie up our large, expensive, power operated machines. The No. 1½ turns out as many as 25 different jobs in a day — grinds dies, flat work, gauges and toolmaker's jobs of highest precision. The men like the large handwheels and handy controls, but the most important feature is the spindle with the 1 h.p. motor mounted directly on it. This integral mounting gets rid of belting troubles, and eliminates practically all vibration. The ABRASIVE 1½ has certainly proved a profitable machine in our shop".

Write for complete bulletin.



MACHINE TOOL SHOW · CHICAGO SEPT. 17-26 · MCMXLVII

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EAST PROVIDENCE 14, RHODE ISLAND

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ACCURACY BOOSTS PRODUCTION

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END MILLS
Union experience in tool design gives you end mills with free cutting action that produces fine finishes at profitable high speeds. And Union knowledge of steel and the latest methods of heat treating give you end mills that will take repeated resharpenings. For production economy — and tool economy—make Union Quality End Mills your standard for every job.
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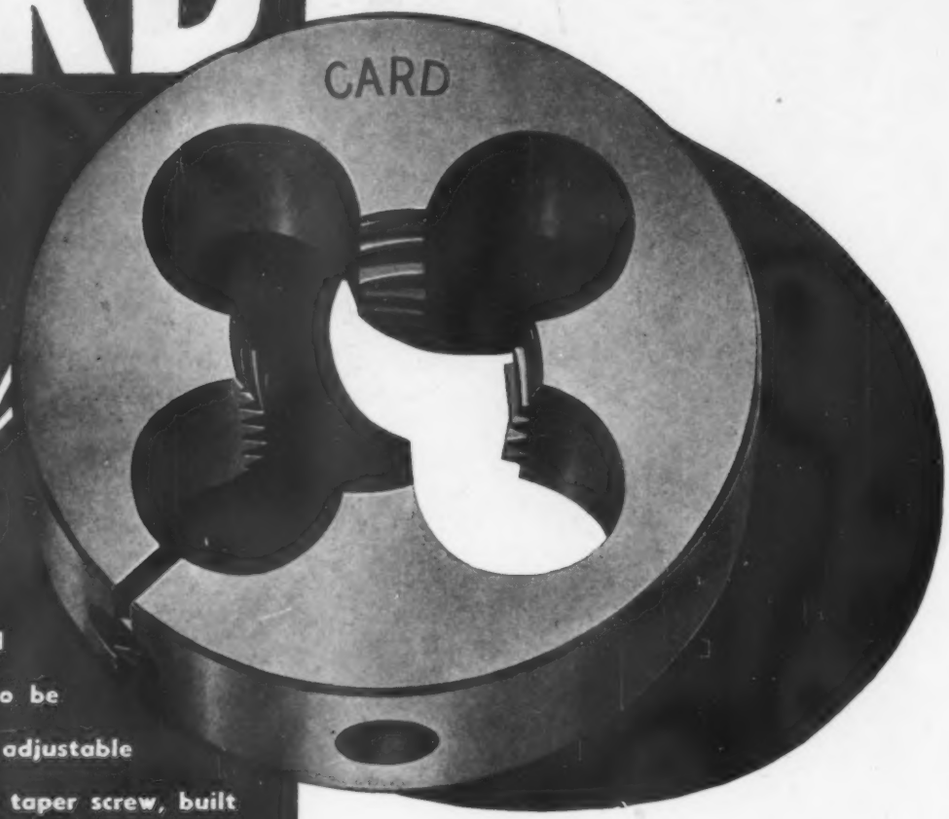

Round DIES

Produced of hardened tool steel, designed to be readily and accurately adjustable by means of a simple taper screw, built to retain their size when removed from the holder — Card Adjustable Round Split Dies are available in all standard thread sizes and forms. On both hand and screw machine work they will produce long runs of threads profitably and accurately, with a minimum of lost time for adjustment and resharpening.

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Divisions of the
Union Twist Drill Co.

S. W. CARD MFG. CO.

Mansfield, Mass.

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Butterfield TAPS

RIGHT FOR THE JOB!

RIGHT ON THE JOB!

You can select the right tap for every job from the complete Butterfield line . . . and know that it will be right on the job . . . that it will produce the extra long runs of accurate threads that mean profits on quantity production . . . that it will take repeated resharpenings without losing its free-cutting, fast-cutting characteristics. Each Butterfield Tap is right on the job, because it has been made right for the job.

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Divisions of the
Union Twist Drill Co.

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MACHINE TOOL SHOW

September 17 to 26, 1947

Booth 308 in Center of Building

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THE LATEST IN
UP TO THE MINUTE

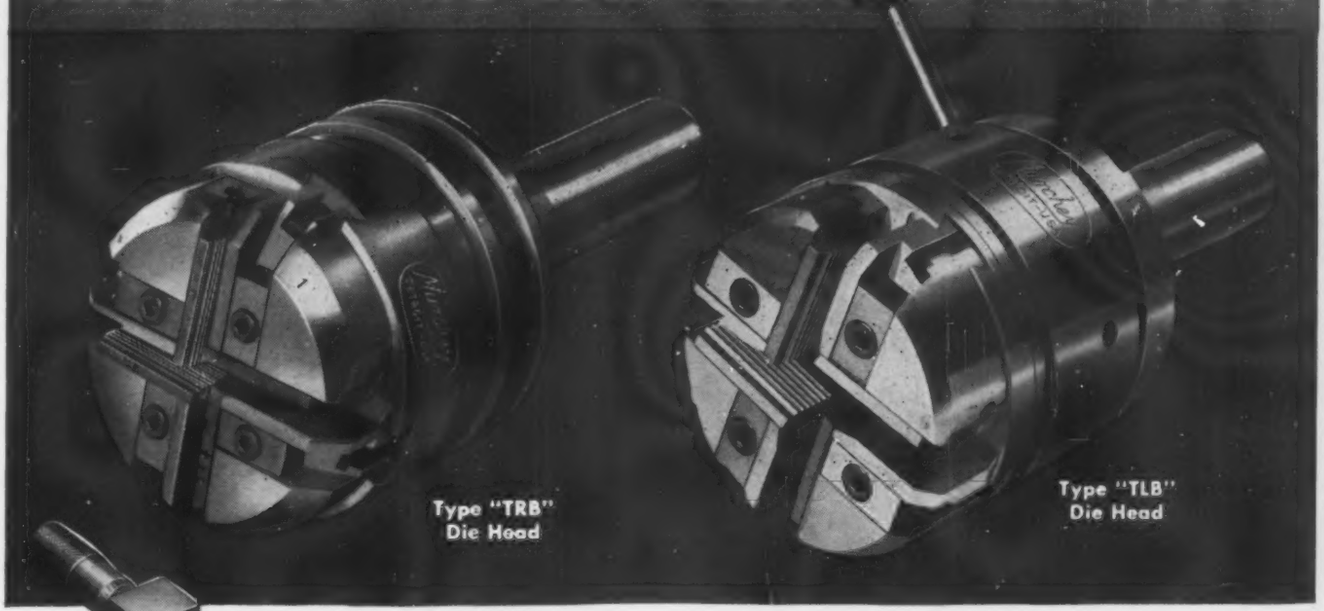
DRILLING MACHINES

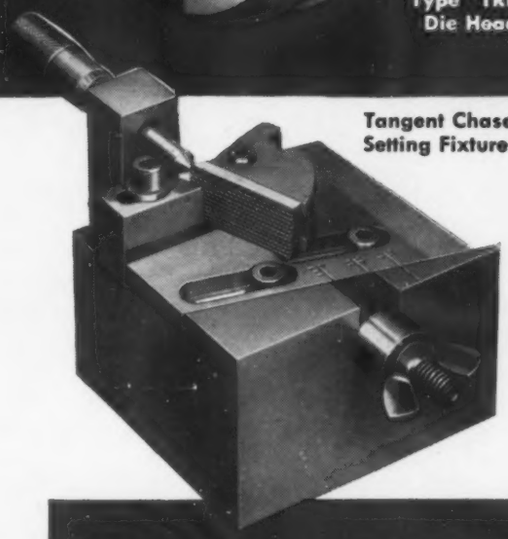
LELAND-GIFFORD

WORCESTER 1, MASSACHUSETTS, U. S. A.

Lower Cost Per Thread...

With these two new MURCHEY die heads





Tangent Chaser Setting Fixture

Chasers for all Murchey tangent chaser die heads are precision set in the chaser holding blocks on this Universal Micrometer Setting Fixture. Its use insures accurate and equal setting and finer quality threads with minimum chaser wear.

These two new tangent chaser die heads will enable you to produce more threads quicker at lower costs.

Down time is reduced—and productivity increased by the new design. Dull chasers are quickly replaced with chasers and holding blocks previously set to exact location in a Murchey Chaser Setting Fixture.

Replacement of chasers and holding blocks is made without changing size adjustment—and usually without removing the tool from the machine.

One of these new Murchey Die Heads and extra sets of chasers and holding blocks will, therefore, do the job of two or more tools.

Chasers of any given pitch, together with proper chaser holding blocks, are used for any diameter of threaded part within the capacity of the die head. Chaser life is exceptionally long because in sharpening it is necessary to clean up only the cutting face. No further grinding is needed.

There are two die heads: the "TRB" for use on machines where the tool rotates, such as the automatic screw machine, drill press, etc., and the "TLB" for machines on which the tool remains stationary, such as the turret lathe and hand screw machine.

Ask your Murchey representative to show you these money-saving, time-saving tools.

Write for new Murchey catalog on Threading Tools.

MURCHEY MACHINE & TOOL CO.
Detroit 26, Mich.

MURCHEY

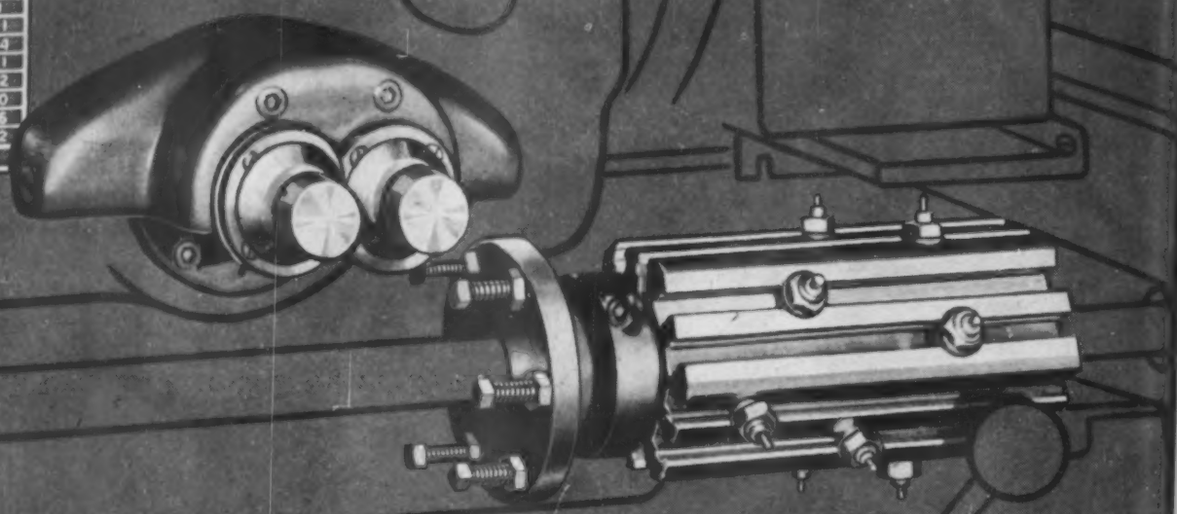
DIVISION OF THE SHEFFIELD CORP.
DAYTON 1, OHIO, U.S.A.

GISHOLT FASTERMATICS

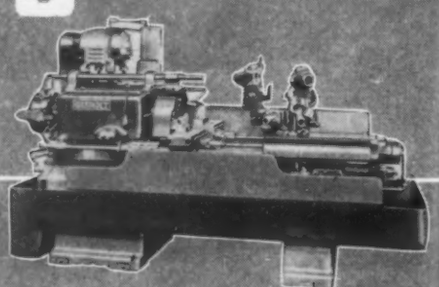
(AUTOMATIC TURRET LATHES)

CHANGE GEARS NO. TEETH UPPER	LOWER	SPINDLE SPEEDS VALVE DIAL POSITIONS NO. 1 & 3	NO. 1 & 4	NO. 2 & 3
25	65	22	40	74
29	61	27	50	91
33	57	33	61	111
37	53	40	75	134
41	49	49	87	161
45	45	57	105	192
49	41	68	125	230
53	37	81	150	276
57	33	98	181	332

DRIVE SHAFT SPEED 1040 R.P.M.



These simple controls provide automatic (or manual) selection of speeds--to save time --cut machining costs



GISHOLT MACHINE COMPANY, *Madison 3, Wisconsin*

THE GISHOLT ROUND TABLE

represents the collective experience of specialists in the machining, surface-finishing, and balancing of round and partly round parts. Your problems are welcomed here.

THE FASTERMATICS—Speed changes are effected as buttons in spool contact hydraulic control knobs. Changes may be made automatically at any point during hexagon turret's travel, or manually for convenience of set-up. Various ranges of spindle speeds are available.

turret lathes · automatic lathes · superfinishers · balancers · special machines

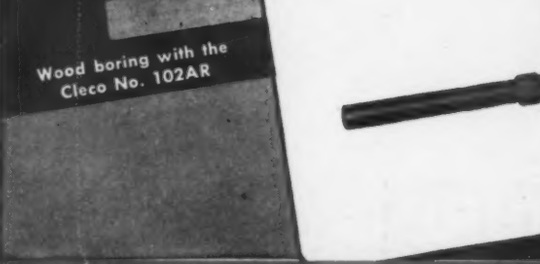
USE Cleco ROTARY DRILLS for • DRILLING

- REAMING
- TAPPING
- NUT SETTING
- SCREW DRIVING
- WOOD BORING
- FLUE ROLLING

No. 101A, drilling steel on maintenance work

No. 103AR driving stay bolts

No. 103AR Drill on a flue rolling job



Wood boring with the Cleco No. 102AR

Here are just a few of the many reasons why versatile Cleco Drills give outstanding performance on all these operations. The rotary motor in Cleco Drills consists of a 4-blade rotor, concentric with the arbor, and an economically renewable cylinder bushing. The one-piece rotor is machined from alloy steel, expertly heat treated and ground to close tolerances. These drills operate with perfect balance, and smooth, vibrationless action at all speeds. Wide blade design increases blade life and promotes economical motor action.

Cleco Drills always start immediately under load, because air is admitted under each blade to insure perfect contact with the cylinder wall throughout the power sector. An efficient governor controls the speed whether idling or under various loads—this insures ample power at all times plus maximum economy in air consumption.

Bulletin 83 describes these useful drills in detail . . . . . ASK FOR IT!

Cleco No. 103A Drill. Extension and Snap Throttle are optional equipment.

Cleco PNEUMATIC TOOL DIVISION
of THE REED ROLLER BIT COMPANY
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The CECO-DROP makes other gravity drop hammers obsolete

CHAMBERSBURG
Builders of **IMPACT** *Machinery*

1897 ★ Fiftieth Anniversary ★ 1947

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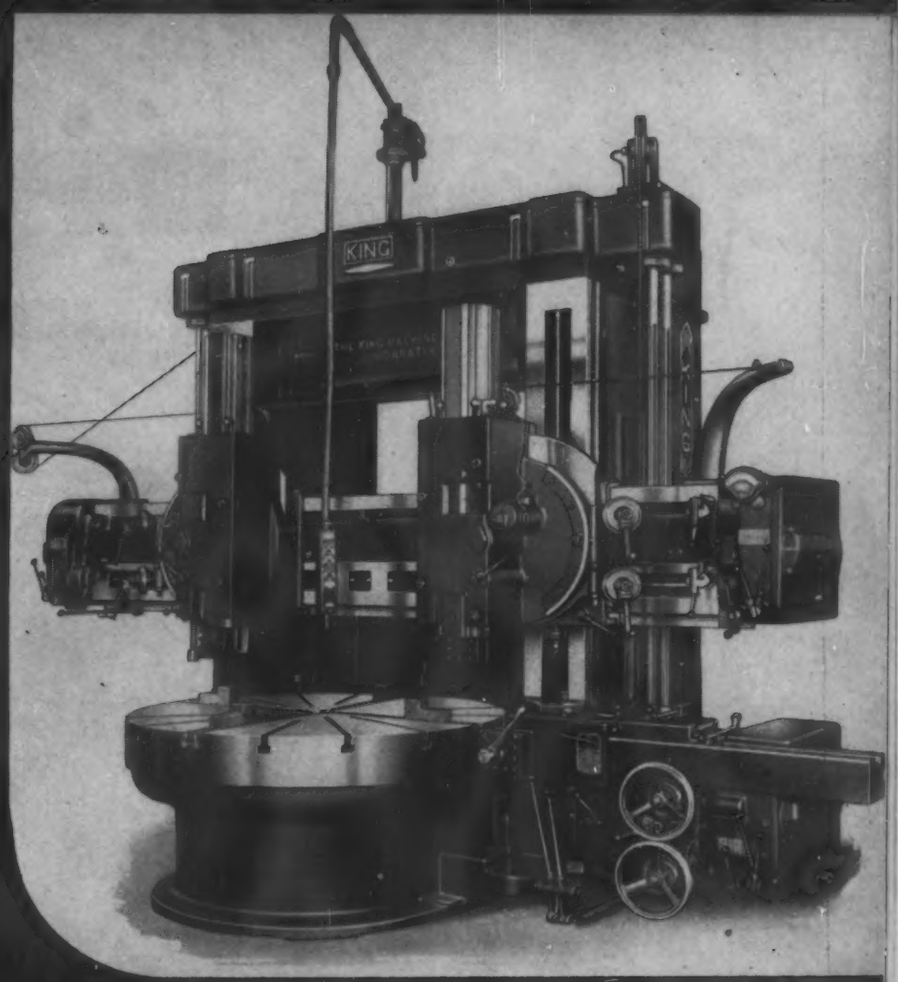
The New KING *Controls Pay off* IN TIME AND COST SAVINGS



● For example on the new KING the operator can select his speeds, set his feeds, rapid traverse the head to the job, make minute hand adjustment of the tool, start and stop the table—all from his normal work position. This centralization of controls and convenience of operation enables the operator to do a better job—easier—faster and at considerable saving in time and cost.

You will also be impressed by the massive proportions of the new KING, as the machine is substantially heavier offers a wide selection of feeds and speeds—is clean cut and modern in appearance.

And if you watch one of those new, husky ram heads hog off metal with carbide tools you'll know you are getting better results and that your selection of KING was a wise investment.

Available in ten sizes 30", 36", 42", 52", 62", 72", 84", 100", 120" and 144".

THE KING MACHINE TOOL COMPANY

CINCINNATI 29, OHIO

Builders of Vertical Boring and Turning Machines and Sebastian Lathes

Should your AIR-POWER *system be* CENTRALIZED *or* DECENTRALIZED?

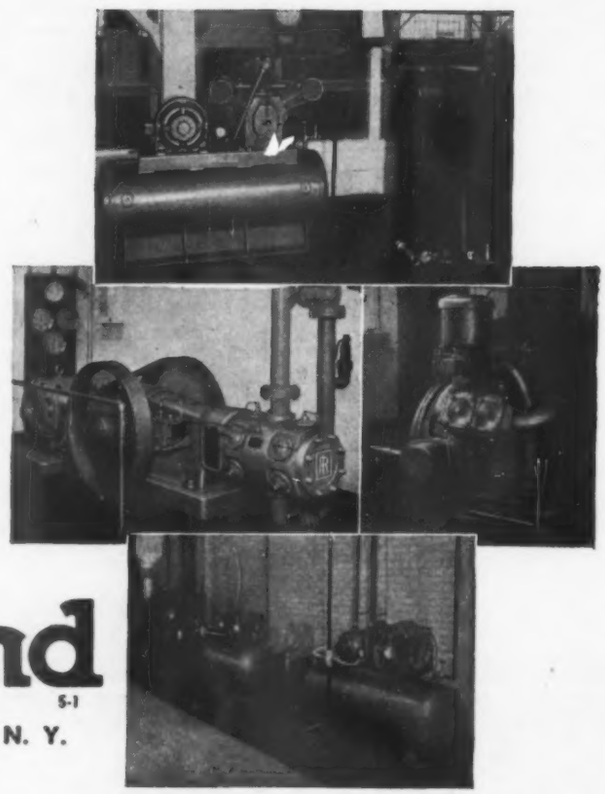
If you have a shop where you need Air Power at scattered or isolated spots, your first impulse may be to install a decentralized source of Air Power . . . a small compressor at each location. But before doing this, consider these points:

Flexibility — **Load Factor**
Power Rate — **Piping System**
First Cost — **Attendance**
Installation — **Maintenance**

For example, during certain hours, seasons, or cycles, the maximum demand for air may shift from one part of your plant to another. If you had a central compressor plant with an adequate piping system, the full capacity of your entire plant could be made available to *any* section of the shop at *any* time. You may find that part of shop should have a centralized system, the other decentralized, or a combination of both systems.

• • •

When you plan a new plant or an extension, or feel that it's time to modernize your system, call in an Ingersoll-Rand engineer. He's an Air-Power Specialist, and represents a company that builds a complete line of compressors...for centralized, decentralized, or combination systems . . . sizes from ½ to 3000 horsepower . . . air-cooled and water-cooled types . . . pressures from vacuums to 15,000 psi. . . . drives by electric motor or built-in steam, gas, or diesel engines.



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TURBO BLOWERS • CONDENSERS
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A·H·Q*

IN CHICAGO AT THE DODGE-CHICAGO PLANT

To earn profits in the face of high labor and material costs, Industry must turn to Accuracy as never before. At the Machine Tool Show, manufacturers will see Accuracy at work — especially at A.H.Q. (*Accuracy Headquarters) — the P&W Booth, that is. There'll be big news — accuracy news — news you won't miss . . . for the 6,000 sq. ft. P&W Booth will be one of the biggest at the Show. Here are just a few hints of the news for you at A.H.Q. . . .

Booth No. 55 in the *northeast* corner

1 ***Precision Machine Tools.*** Jig Borers, Lathes, Vertical Shapers, Thread Millers, Surface Grinders, Gear Grinders . . . for effective precision manufacturing and toolroom production . . . they'll all be working at A.H.Q.

2 ***Die Sinking and Mold Exhibit.*** The newest P&W Die Sinkers and Keller Tracer-Controlled Machines in action on a full range of work from small cavities up to large automotive dies.

3 ***Kellerflex Flexible Shaft Machines.*** Including the full range of attachments and accessories . . . plus a "try it yourself" demonstration of the amazing cutting ability of the new Keller Carbide Burs.

4 ***Small Tools.*** You'll see a complete showing of P&W taps, dies, reamers and milling cutters at A.H.Q., plus some interesting carbide tool developments.

5 ***Precision Gaging Equipment.*** Everyone knows the basic accuracy of the many P&W Conventional Type Gages . . . of P&W's Electrolimit and Air-O-Limit Comparators. The gage news at A.H.Q. will be new ways to engineer them into gaging systems for quality control and selective assembly.

6 ***New Literature.*** Fully descriptive Pratt & Whitney literature will be available at A.H.Q. But you won't need to lug it. Just register for the pieces you want, and it will be sent to you, promptly.

7 ***The Experts Will Be There.*** You'll meet the men who engineer accuracy into P&W machines, tools and gages . . . at A.H.Q. They'll be on hand to help you on the solution of your problems. Come early and often to see them . . . you'll find a comfortable chair and a warm welcome at A.H.Q.

PRATT & WHITNEY

Division Niles-Bement-Pond Company

WEST HARTFORD 1, CONNECTICUT

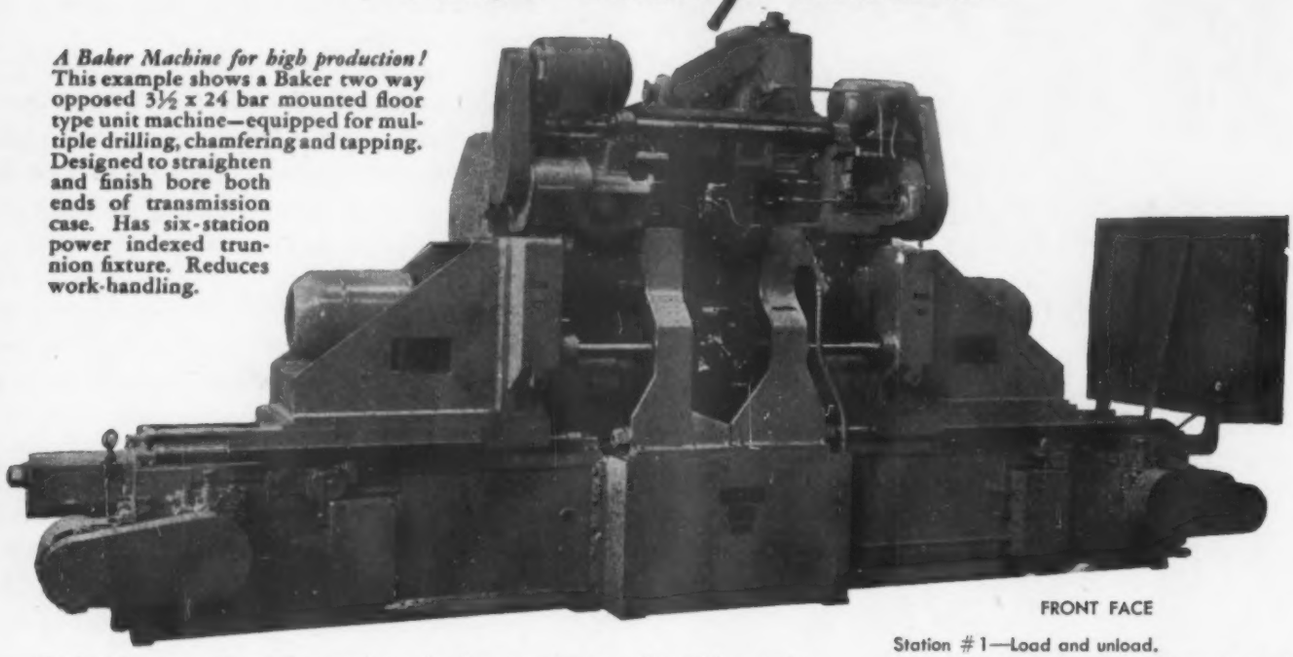
Accuracy P&W *Headquarters*

MACHINE TOOL SHOW CHICAGO SEPT. 17-26

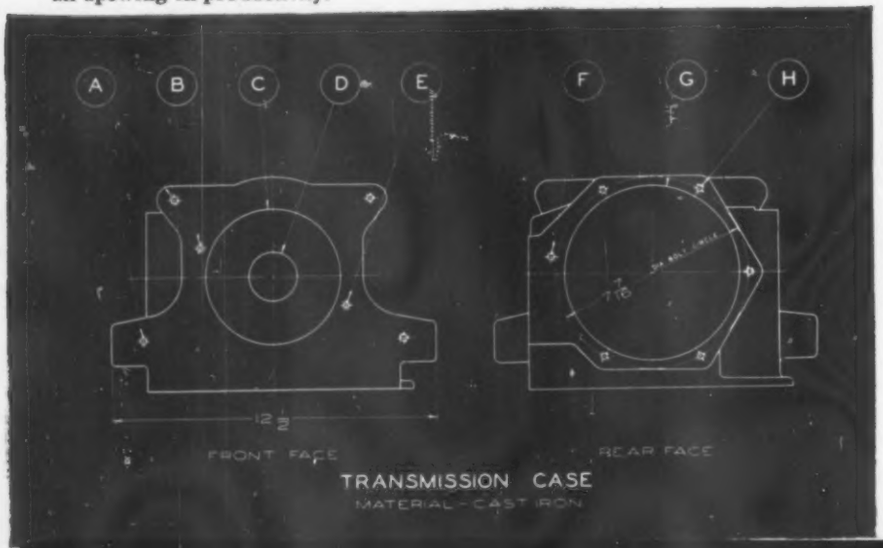
BAKER Multi-Operation

★Two Way MACHINE

A Baker Machine for high production! **This example shows a Baker two way opposed 3½ x 24 bar mounted floor type unit machine—equipped for multiple drilling, chamfering and tapping. Designed to straighten and finish bore both ends of transmission case. Has six-station power indexed trunnion fixture. Reduces work-handling.**



Backed by over 70 years experience in the manufacture of machine tools; Baker Machines are engineered to offer greater production and improved accuracy by combining operations and reducing work handling. Baker units are highly flexible . . . can be adapted to a wide range of operations including single or multiple spindle drilling, boring, reaming, counterboring, hollow milling and chamfering. Send us details about your job problem. We'll be glad to show how a Baker machine will help you beat rising costs with an upswing in productivity.



TRANSMISSION CASE
MATERIAL - CAST IRON

FRONT FACE

Station # 1—Load and unload.
Station # 2—Bore 1.925" one inner hole "D"
—Bore 5.188 & C.B. 5.595 one hole "C".
Station # 3—Bore 1.950" one inner hole "D"
—C.B. 5.625" one hole "C".
Station # 4—Drill .4219"—Four holes "A".
Drill .261" and C.B. .508" one hole "B".
Drill .261" one hole "E".
Station # 5—Chamfer with .5625" drill—Four holes "A".
Chamfer with .375" drill—Two holes "B" and "E".
Station # 6—Tap ½"—13—Four holes "A".
Tap 5/16"—18—Two holes "B" and "E".

REAR FACE

Station # 1—Load and unload.
Station # 2—Bore 6.740" one hole "G".
Station # 3—Drill .375" and Chamfer .4687" one hole "F".
Station # 4—.316" drill—Five holes "H".
.328" drill—One hole "F".
Station # 5—Chamfer with .375" drill—Five holes "H".
Ream .390" and .343"—One hole "F".
Station # 6—Tap 3/8"—16—Five holes "H".
Tap 7/16"—20—One hole "F".

BAKER BROTHERS, Inc. TOLEDO OHIO

DRILLING . . . TAPPING . . . KEYSEATING . . . CONTOUR GRINDING MACHINES

See us at MACHINE TOOL SHOW Chicago—Sept. 17-26 BOOTH 639

KEEP YOUR MACHINES *Running*

DON'T STOP SPINDLES TO CHANGE TOOLS

MODERN-MAGIC CHUCK
AND COLLET EQUIPMENT

Increase your production through elimination of spindle stoppage for tool change. With Modern-Magic Chuck and Collet equipment, tools are quickly and easily changed as the spindle revolves at operating speed. Simple, advanced design makes Modern-Magic Chucks and Collets practically trouble-free. Sturdy, fool-proof construction insures longer accurate service. Your copy of Bulletin M-101 giving full information will be sent upon request. Today?

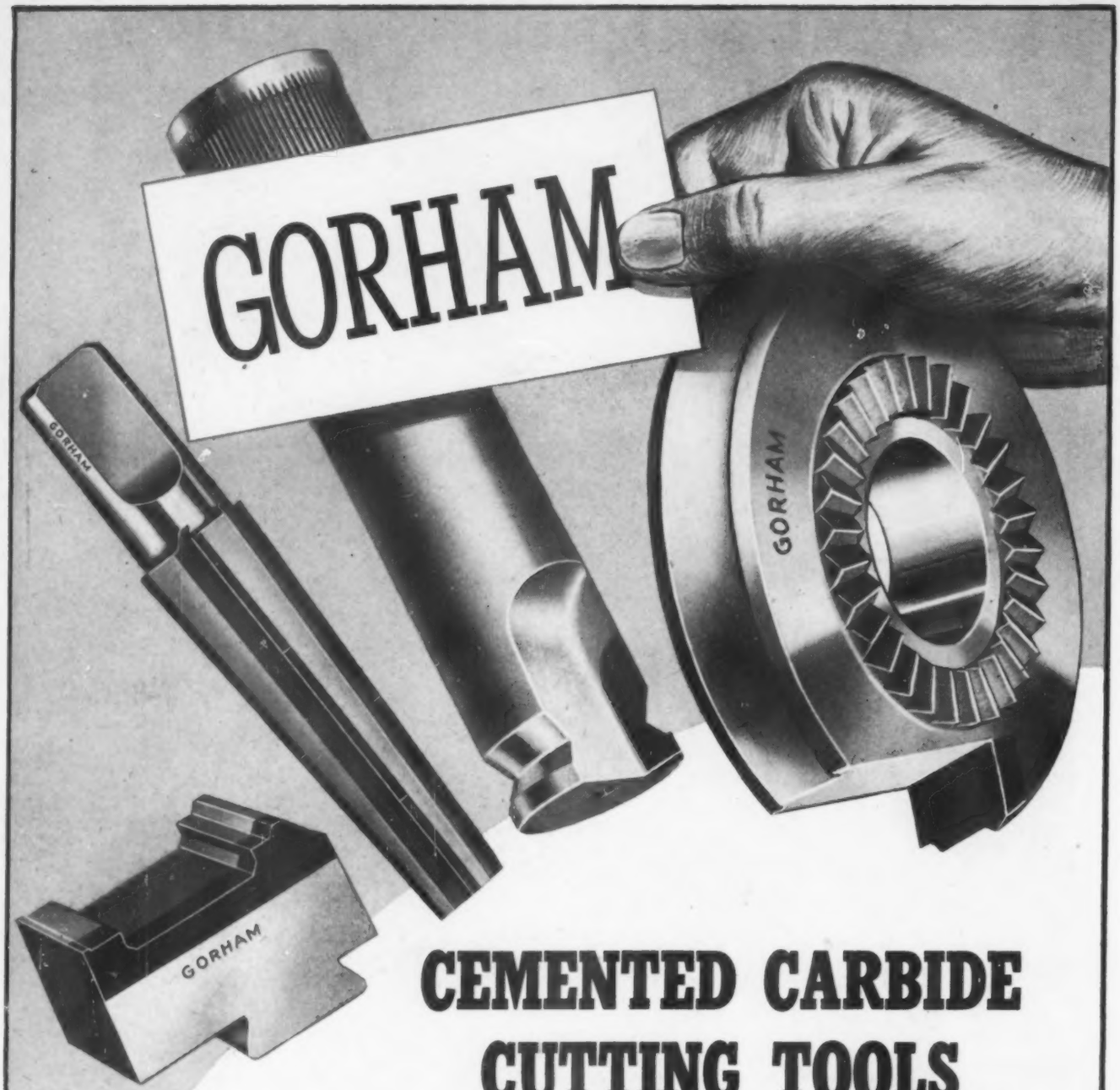
PROMPT SHIPMENT..... USUALLY MADE FROM STOCK

MODERN TOOL WORKS

DIVISION OF

CONSOLIDATED MACHINE TOOL CORPORATION

ROCHESTER 10, NEW YORK



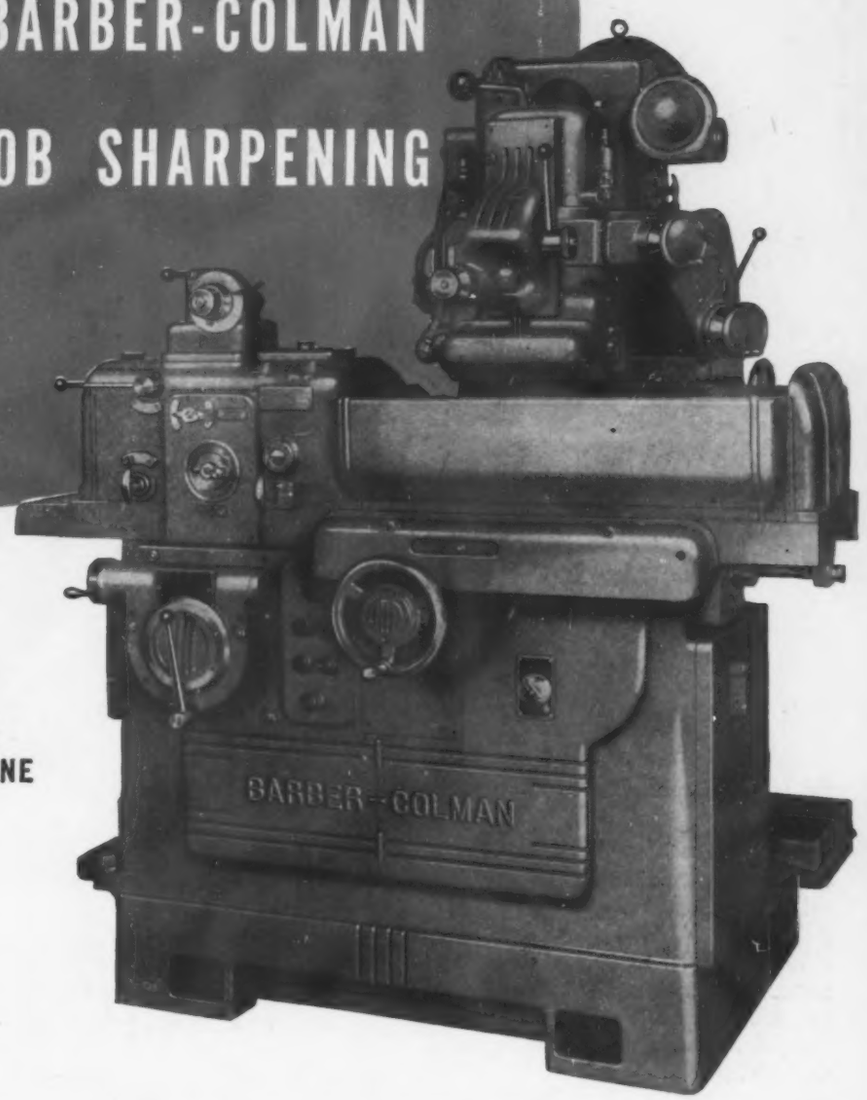
CEMENTED CARBIDE CUTTING TOOLS OF *Quality*

Let our engineers assist you in the design and application of your Carbide Tipped Cutting Tools. No job too small or too large. Send your inquiries for our engineers' immediate attention.

GORHAM TOOL COMPANY

14400 Woodrow Wilson Avenue, Detroit 3, Michigan

A new BARBER-COLMAN AUTOMATIC HOB SHARPENING MACHINE



NO. 6-5 HYDRAULIC ADJUSTABLE STROKE HOB SHARPENING MACHINE

for • IMPROVED ACCURACY • CARBIDE SHARPENING • FINER FINISH

featuring • VARIABLE STROKE • HYDRAULIC CYCLING • AUTOMATIC OPERATION

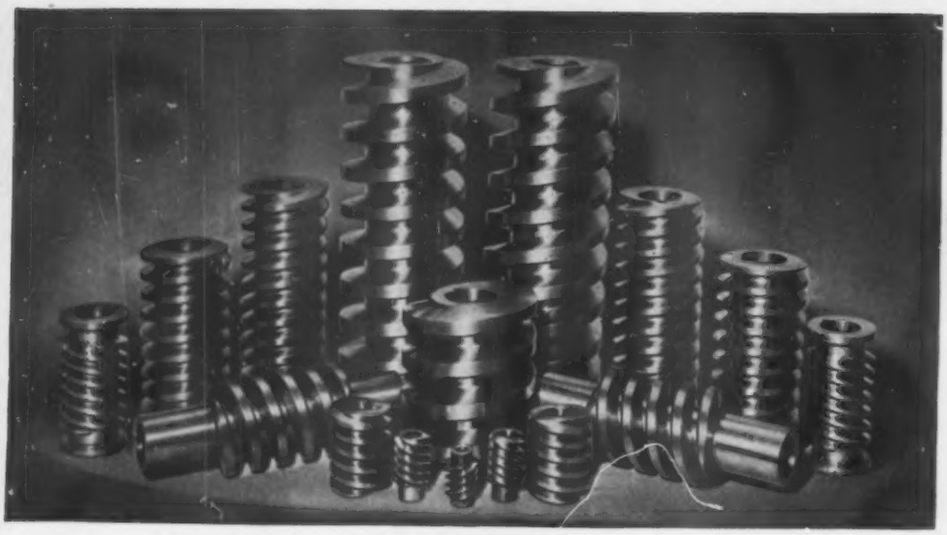
to eliminate • WORK INSPECTION ON THE JOB • REGRINDING FOR CORRECTIONS

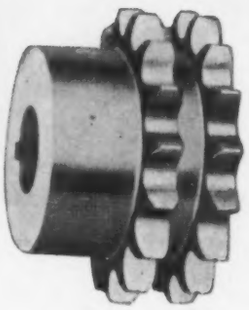
A completely new machine from the bed casting up, with automatic hydraulic stroke, the No. 6-5 has been designed to meet the need for faster sharpening, micro-finish on carbide tools, wet or dry grinding, and a degree of accuracy and finish never before attained by commercial face sharpening equipment. This machine will be demonstrated at the Machine Tool Show and complete information and operating features will be made available at that time. This announcement is made in advance, to assist you in scheduling visitations for all interested shop personnel. Don't fail to see this machine.

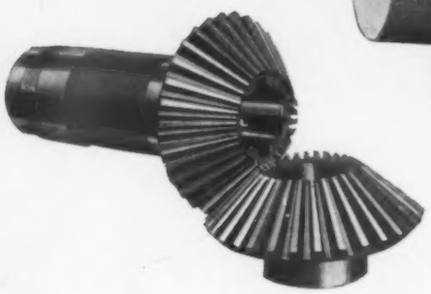
BARBER B-C COLMAN

Barber-Colman Company

GENERAL OFFICES AND PLANT 111 LOOMIS ST., ROCKFORD, ILLINOIS, U.S.A.







the ADAMS line

SPUR GEARS
HELICAL GEARS
BEVEL AND MITER GEARS
WORMS AND WORM GEARS
SPROCKETS
INTERNAL GEARS (Spur and Helical)
RATCHETS
SPLINED SHAFTS
RACKS
LEAD AND FEED SCREWS
GROUND TOOTH GEARS (Spur and Helical)
SHAVED TOOTH GEARS (Spur and Helical)
GROUND THREAD WORMS

Are you looking for ways to improve your product?

Check these advantages of Adams custom made gears:

- √ Made by skilled gear craftsmen.
- √ Cut on modern precision machines.
- √ Careful inspection and control throughout manufacture.
- √ Exact conformance with your specifications.

Adams gears are made to suit the particular requirements of your product and to make that product perform as efficiently and dependably as possible. Investigate the advantage of Adams custom made gears for your needs. Write THE ADAMS COMPANY, 1942 Bridge St., Dubuque, Iowa.

The ADAMS Compa
Dubuque, Iowa, U. S. A.

GEARS

FINE GEARS MADE TO YOUR SPECIFICATIONS . . . . . ESTABLISHED 1883

Vulcan's Quality Creed

HIGH PRODUCT QUALITY

HIGH

YOUR CUSTOMER GOODWILL

YOUR SALES

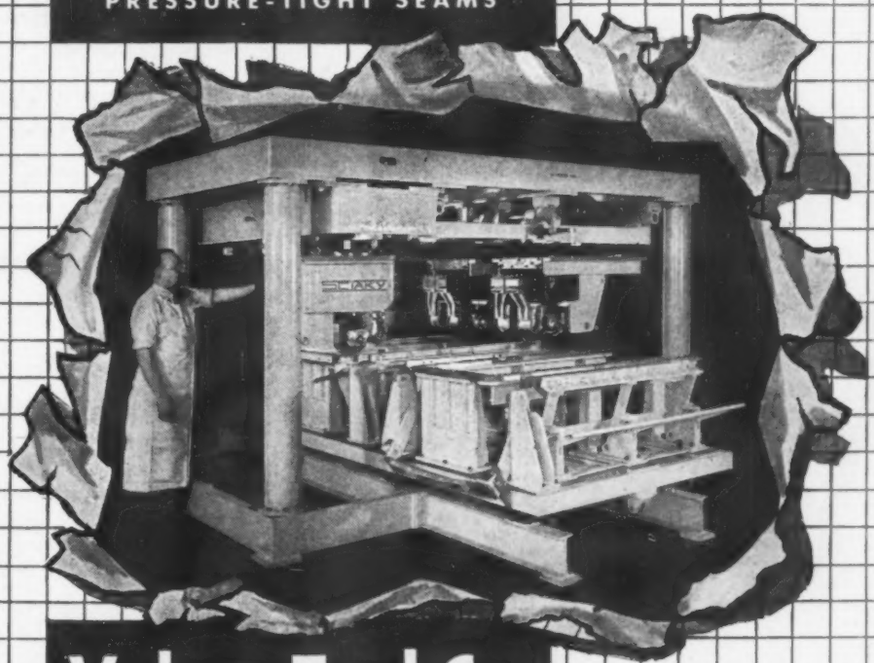
YOUR PROFITS

AVERAGE

LOW

...for instance:

INCREASING THE QUALITY OF REFRIGERATOR SHELL THROUGH WELDING PRESSURE-TIGHT SEAMS



Product quality is a vital factor in customer good will—it also influences sales—influences profits. Equipment used to manufacture quality products must be made with quality if they are to produce quality. This is the Vulcan Creed.

In the case of the refrigerator shell, the manufacturer wanted to improve his product by welding a pressure tight seam where the rear panel joined the shell. A quality fixture was built by Vulcan which enabled the manufacturer to accomplish this improvement — without sacrificing production volume or increasing labor costs.

• • •

Vulcan Tool Co.

DAYTON 10 • OHIO • U.S.A.

The Vulcan Quality Creed gives you Tools, Dies, Fixtures and Special Machinery which will help you to increase Customer Good Will—your sales and your profits.

WHY YOU CAN "CLEAN UP" FASTEST...

by BLANCHARD grinding:

PER-PIECE MILLING time: 12 min.

PER-PIECE BLANCHARD time: 3.6 min.

THE JOB... Cast iron work chain idler brackets—ground from rough casting to a commercial finish. Size of pieces: 16¾" x 6¾" x 4⅝"

These intricate pieces are held securely by simple support blocks on the 36-inch magnetic chuck of a No. 18 Blanchard Surface Grinder. Putting these pieces on the Blanchard eliminates the need for a special holding fixture. Thirteen pieces are placed on the chuck at each loading.

BLANCHARD GRINDING THESE PARTS REDUCED THE PER-PIECE MACHINING TIME TO 3/10 OF THAT NECESSARY WHEN A MILLER WAS USED

It will pay you to ask yourself—and us—on old and new work: "Can we put it on a Blanchard?"

Whether your grinding requires hogging cuts or light finish cuts, fine finish and/or extreme accuracy, avail yourself of Blanchard *Free Consultation Service*. Another Blanchard Service is *Sample Grinding* on which you pay only the transportation charge.

Send for your free copy of "Work Done on the Blanchard", third edition. This new book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

Visit Us at Chicago Machine Tool Show Booth 226

BLANCHARD

The BLANCHARD MACHINE COMPANY

64 STATE STREET, CAMBRIDGE 39, MASS., U. S. A.

IT'S THE UNANIMOUS DECISION

MORE GOODS FOR MORE PEOPLE
AT LOWER COST

It's the unanimous decision of more than 100,000 management, production, engineering, purchasing and financial executives, that anyone concerned with metalworking should attend the 1947 Machine Tool Show. They are going themselves—which proves the point.

For the first time in twelve years you can see the newest products of 250 leading manufacturers—more than 1,000 machine tools, forging machines and other metalworking machinery and equipment of all types and sizes, in full operation—in one place, at one time.

The exhibits will cover 12 acres in the Dodge-Chicago Plant—the largest manufacturing plant, under one roof, in the world.

Take advantage of this exceptional opportunity to inspect the cost-reducing equipment of the future. Send in your advance registration now. You'll avoid delay at the registration desk. If you don't have an advance registration form, write for one today. National Machine Tool Builders' Association, 10525 Carnegie Avenue, Cleveland 6, Ohio.

MACHINE TOOL SHOW

DODGE-CHICAGO PLANT—CHICAGO, ILL.

September 17-26 inclusive

ARMSTRONG

MORE TOOLS PER MAN FOR MORE PROFIT

Even when labor was cheap and tools were costly, it was the best tooled shops that prospered. Now with wages higher and the work days shorter, it becomes imperative that every worker be supplied with every tool that will increase his hourly production.

See that each lathe, planer and shaper operator has the correct ARMSTRONG TOOL HOLDERS for each operation he performs. Equip each machine with its full complement of ARMSTRONG Setting-up Tools. Use better balanced, handier ARMSTRONG WRENCHES on machines and assembly lines. Specify ARMSTRONG Drop Forged "C" Clamps and Lathe Dogs . . . *Today, only quality tools can be truly economical.*

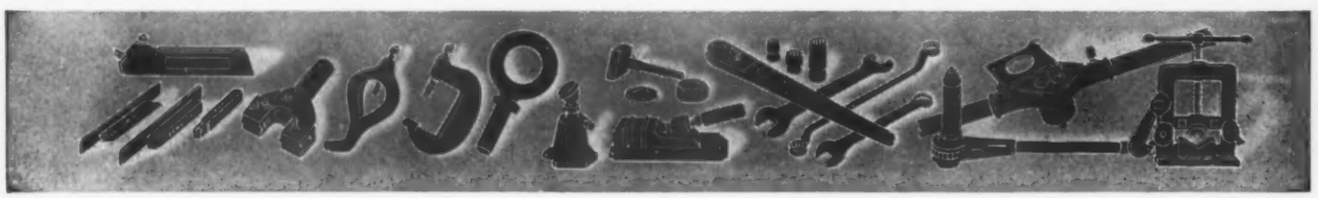
Write for the ARMSTRONG Catalog. It has page after page of production-increasing, cost-cutting tools.

ARMSTRONG BROS. TOOL CO.

"THE TOOL HOLDER PEOPLE"

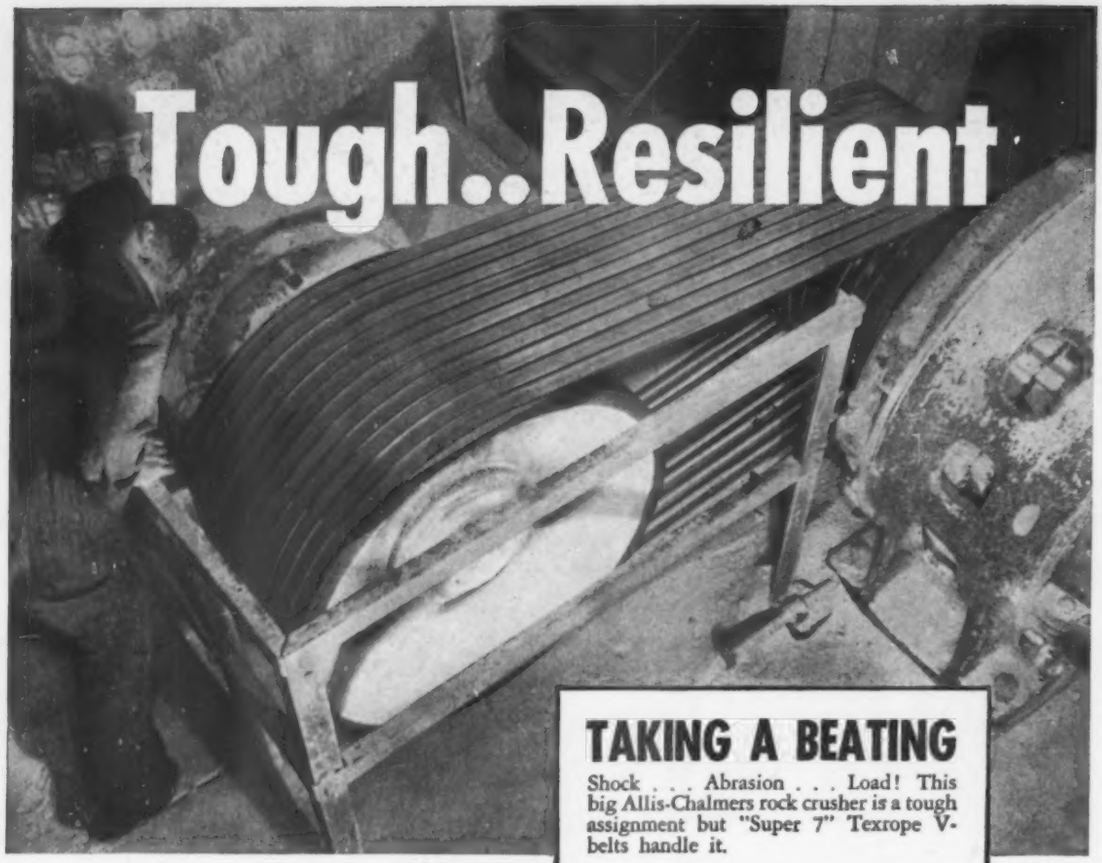
315 N. Francisco Ave. Chicago 12, U.S.A.

New York San Francisco



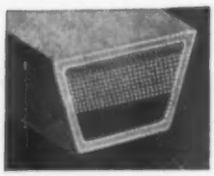
Pre-formed
CARMET CARBIDE
Inserts for
Blanking Dies
Do you have a
"Problem" Part?
Make it of
CARMET

Tough..Resilient



TAKING A BEATING

Shock . . . Abrasion . . . Load! This big Allis-Chalmers rock crusher is a tough assignment but "Super 7" Texrope V-belts handle it.



. . . You get 7 Great Features in "Super 7" Texrope V-Belts

1. TOUGHER COVER. Two layers of tightly woven long-staple cotton fabric and tough, wear-resistant rubber compound. Protects the belt carcass from grit, moisture and wear — holds its shape — assures maximum belt life.

2. SHOCK ABSORBING. "Super 7" belts combine great strength with the degree of resiliency necessary for long life and smooth power transmission.

3. HEAT RESISTING. *All* "Super 7" V-belts are designed and built to give high resistance to heat.

4. STRONGER CORDS. More cords—imbedded in cool-running rubber compound. A powerful load-carrying structure.

5. PRECISION CURED in pressure molds to assure accurate section and perfect bonding of cords, cover and cushion.

6. ACCURATELY MATCHED. Every belt weighed, measured and carefully inspected before being sized and packed.

7. ENGINEERING LEADERSHIP. "Super 7" Texrope V-belts represent 22 years of research and experience — by Allis-Chalmers, originator of the Multiple V-belt drive.

"Super 7" Texrope V-belts come in five types to meet every operating requirement: *Standard — Heat Resisting — Oil Resisting — Oil Proof* and *Static Resisting*. Call your Allis-Chalmers office or dealer. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN.

A 2238

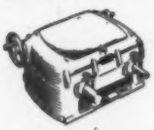
Refer to Sweet's Catalog.

TEXROPE .. Greatest Name in V-Belt Drives

"Super 7" V-BELTS
Five Types — Sizes to suit every power transmission job.

Texsteel, Texdrive, "Magic-Grip"
— sheaves in a full range of sizes, grooves.

"Vari-Pitch" SHEAVES
Exact variations in speed, stationary or motion control.



SPEED CHANGERS
Speed variations up to 375% at the turn of a crank.

ENGINEERING
Finest V-Belt engineering talent in the world—at your call.

TEXROPE "Super 7" V-Belts result from the cooperative research of two great companies — Allis-Chalmers and B. F. Goodrich. They are sold only by A-C.

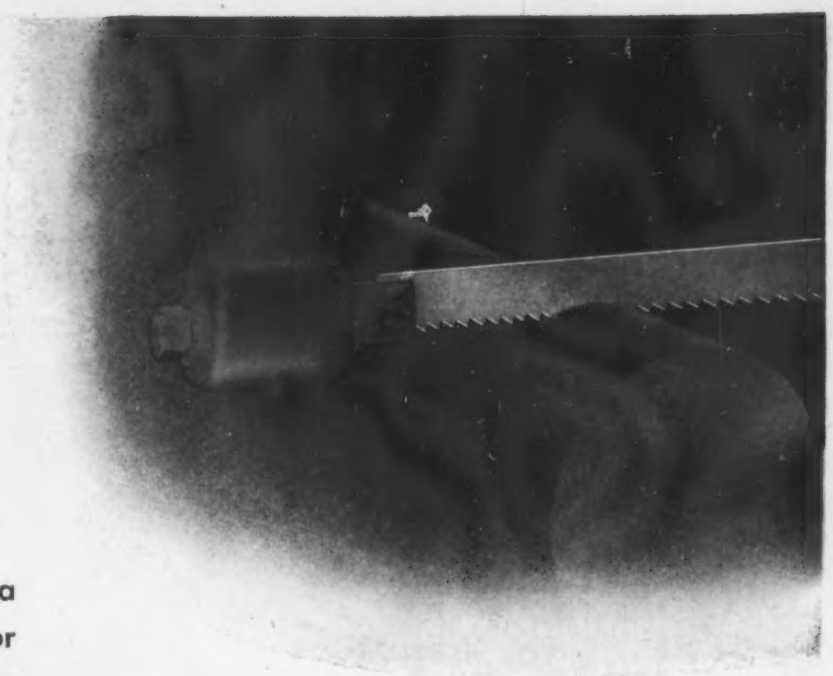
ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment — Biggest of All in Range of Industrial Products

1847 1947
A CENTURY OF SERVICE to Industry THAT MADE America Great

Which is better for you...

A Hack Saw, or a Band Saw?



Only MARVEL can give a strictly impartial answer for only MARVEL manufactures *both* hack sawing machines and metal cutting band sawing machines, and manufactures *both* hack saw blades and metal cutting band saw blades. For this reason, your local MARVEL Sawing Engineer is best qualified to analyze your particular metal-sawing or cutting-off problems and recommend, without bias, the type sawing machine and correct blade to do your work most efficiently.

1947 MACHINE TOOL SHOW CHICAGO SEPT 17-26

MARVEL recommendations are based on actual operational laboratory and field tests covering *cutting-off time and costs* for bars, tubes, and shapes on all types of sawing machines and with various blades. (It is significant that time factors of various so-called "fast" machines vary as much as 4 to 1 on many operations, while costs differ as much as 6 to 1.)

•

Write for new catalog C48, and if you feel that our field service engineer may be helpful to you, let us know.

•

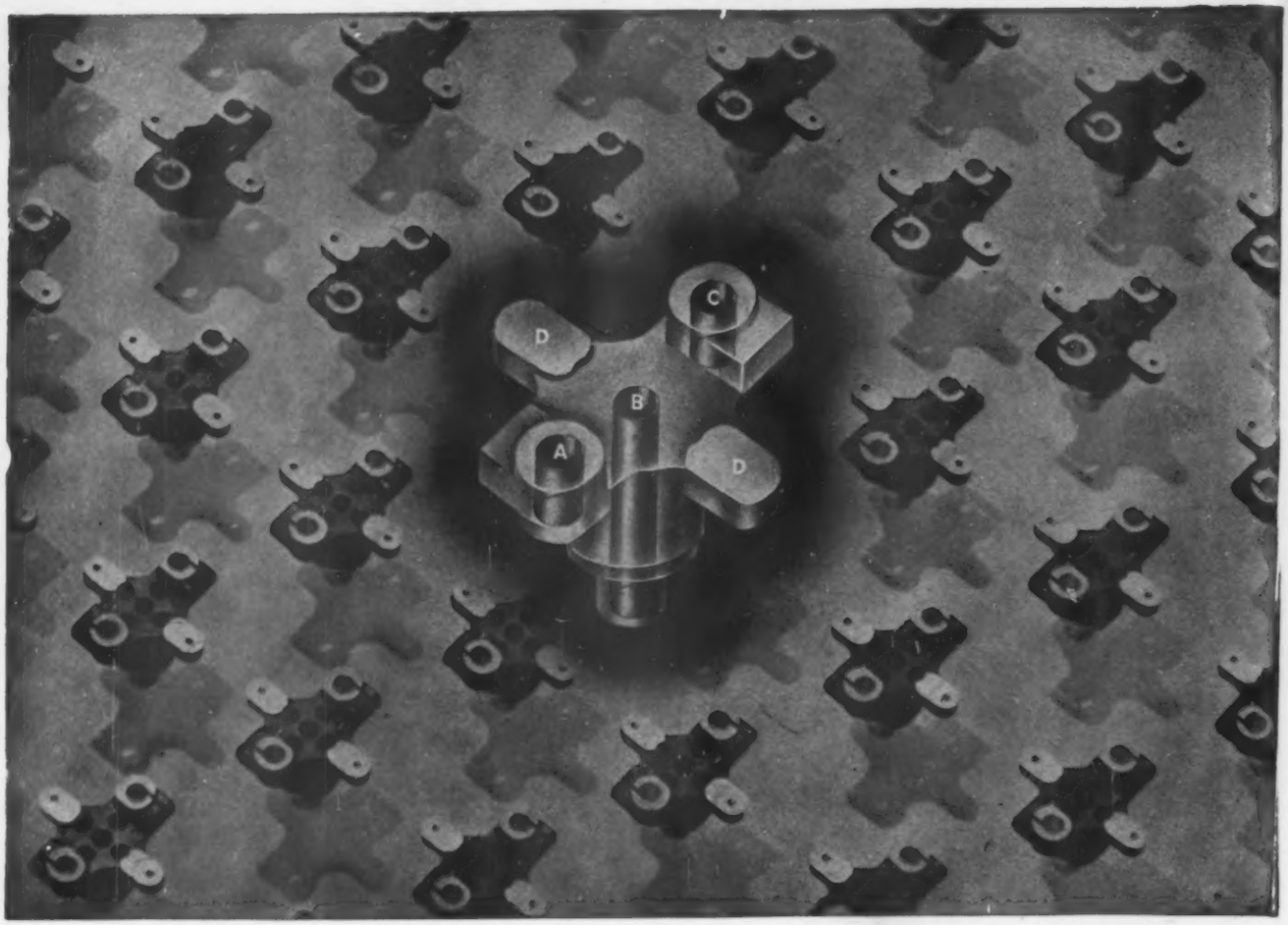
ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 BLOOMINGDALE AVE. CHICAGO 39, U.S.A.

MARVEL *Metal Cutting* SAWS

Better Machines–Better Blades

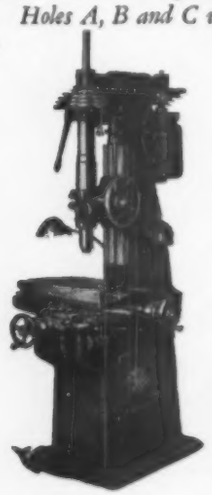


How to use the *Moore Jig Borer* as a Production Machine

Three holes located and sized, two pads milled—in a single set-up; 5,000 aluminum parts—6 minutes each. Are you limiting the capacity of your jig borer by using it only on toolroom work? You needn't... if it's a Moore Jig Borer.

For this versatile machine not only adds toolroom accuracy to your production jobs but often outperforms special-purpose machines. Here's proof on a run of 5,000 aluminum parts:

Holes A, B and C were located to a tolerance of .0005", sized to + .0005",—.0000"...had to be parallel to .001" checked on plugs 1" long...two pads D milled to ±.001".



In order to hold these pads in close relation to the holes, the job was done in a single set-up.

A drill jig couldn't handle such close tolerances; reamers and bushings would wear. Since aluminum is not free-machining, a good finish would be difficult to obtain with reamers.

The only answer was single-point boring. After the holes were roughed out with a jig costing $75, the Moore Jig Borer machined them to exact location and size. The entire operation, including the machining of the two pads, required only six minutes each and reduced appreciably all previous costs.

Such speed and accuracy are the result of the Moore Jig Borer's sensitive spindle which provides speeds to 2,600 RPM, and quick-setting lead screws. The latter, ground to an accuracy of .0002" in 16", enables you to spot, drill, bore and ream holes in one set up, with minimum tool changes.

Remember this versatility when you specify your next jig borer. Meanwhile, write for illustrated literature.

MOORE SPECIAL TOOL CO., INC.
738 UNION AVENUE, BRIDGEPORT 7, CONN.

MOORE JIG BORER

MOORE makes TOOLS

SPOTS, DRILLS, BORES, REAMS...WITH MINIMUM TOOL CHANGES

New SIMOMETER

"Dials you in" on LOWER HACKSAW COSTS

with SIMONDS "Red End" BLADES

SECRET of straighter, smoother cuts and longer blade-life is ACCURATELY TESTED TENSION.

NEW SIMONDS *SIMOMETER* enables you to tension any size blade correctly in a matter of seconds . . . and so get top cutting performance out of the top brand of blades — SIMONDS "Red End".

SEE HOW *SIMOMETER* SAVES SAW-DOLLARS! A Simonds Saw Specialist will demonstrate — on your own hacksaw machines — this easy-to-read tension tester. NO OTHER METHOD LIKE IT. Just call your distributor or the nearest Simonds office.

SIMONDS
SAW AND STEEL CO.
FITCHBURG, MASS.
Other Divisions of SIMONDS SAW AND STEEL CO. making Quality Products for Industry

SIMONDS STEEL MILLS — *Special Electric Furnace Steels*
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SIMONDS CANADA SAW CO. LTD. — *Simonds Products for Canada*

BRANCH OFFICES: 1350 Columbia Road, Boston 27, Mass.; 127 S. Green St., Chicago 7, Ill.; 416 W. Eighth St., Los Angeles 14, Calif.; 228 First St., San Francisco 5, Calif.; 311 S. W. First Avenue, Portland 4, Ore.; 31 W. Trent Ave., Spokane 8, Wash. *Canadian Factory:* 595 St. Remi St., Montreal 30, Que.

● In tool rooms and tool and die shops, where accuracy counts, you'll find Fosdick Jig Borers. The machine is ideal for small lots of precision parts commonly run in tool rooms and tool and die shops.

The heavy duty base, slide, table, column and the sliding head insure the utmost rigidity and accuracy. The ways have a large area and are properly lubricated to eliminate wear.

All controls and operating handles are at the front of the machine—a construction point which substantially reduces operators handling time—and a feature exclusive to the Fosdick Jig Borer.

For example the job shown is a tool shop operation on a Fosdick Jig Borer. It illustrates a precision boring operation on a die.

When you have a job requiring dependable precision put it on a Fosdick Jig Borer. Full Details available in Fosdick Jig Borer Bulletin J. B. A. Write for yours.

Where precision counts

FOSDICK JIG BORER

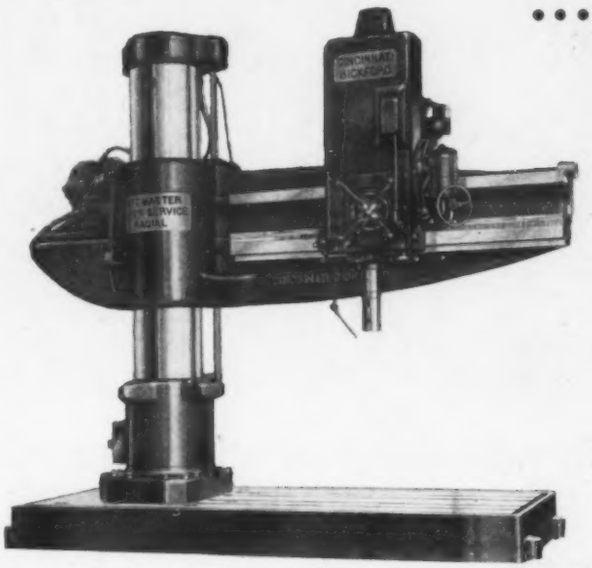
THE Fosdick MACHINE TOOL COMPANY

CINCINNATI 23, OHIO

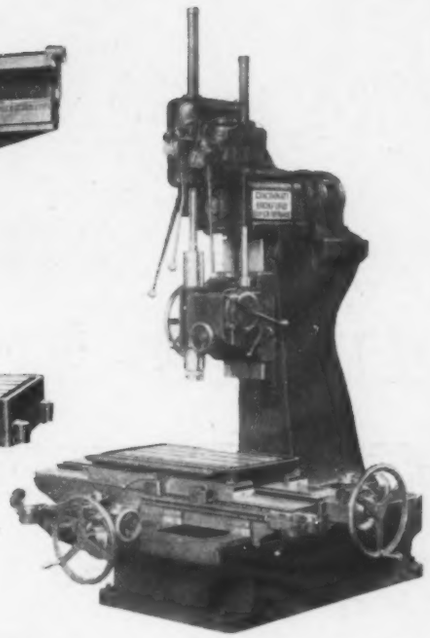
In Action—

The Complete CINCINNATI BICKFORD Line

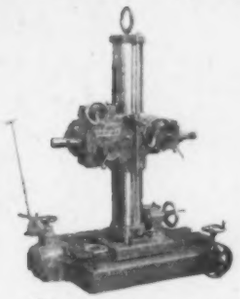
...OF DRILLING MACHINES



7′ to 12′ Arm, 22″ or 26″ Diameter Column. Send for Circular R-22.



SUPER SERVICE Jig Boring Machine. Bulletin U-26.

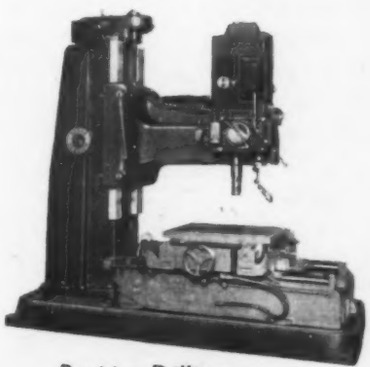


Portable Horizontal. Bulletin HR.

You will see SUPER SERVICE Radial Drilling Machines ranging from 2½′ arm length and 7½″ diameter column to 10′ arm length and 26″ diameter column. These machines have many new features never before offered as standard equipment.

You will see the new SUPER SERVICE Uprights in 21″, 24″ and 28″ sizes.

You will see the SUPER SERVICE Jig Boring Machine, a new Portable Horizontal Metal Drilling Machine and a new Precision Drilling Machine at Booths 514 to 517 at the Machine Tool Show.



Precision Drilling Machine. Circular FH.

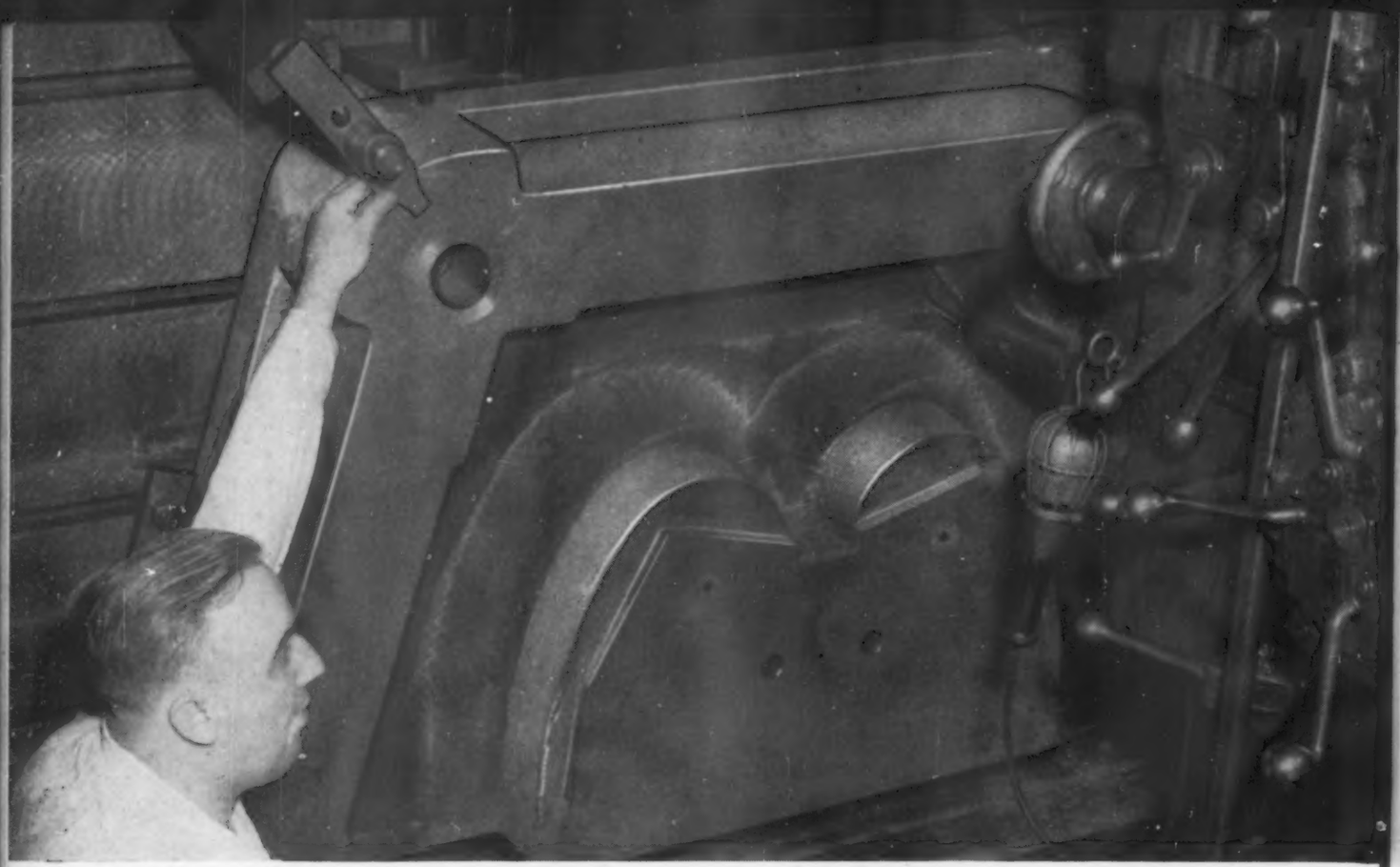
Direct Drive SUPER SERVICE Uprights. Booklet U-27.

MACHINE TOOL SHOW
DODGE PLANT
Chicago, Sept. 17-26
Booths 514 to 517

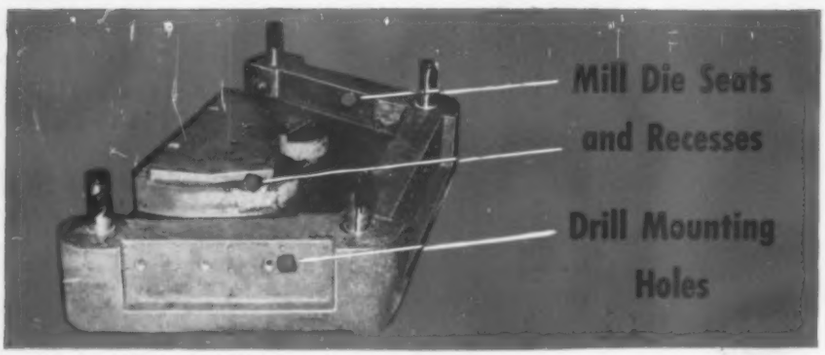
RADIAL AND UPRIGHT SUPER SERVICE DRILLING MACHINES

Equal Efficiency of Every Unit Makes the Balanced Machine

THE CINCINNATI BICKFORD TOOL CO. Cincinnati 9. Ohio U.S.A.



DANLY Special Die Sets— *Ready for mounting the Dies on Specification*

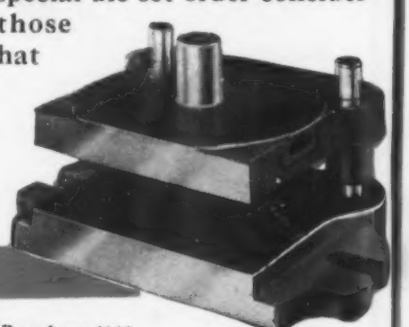


"Mill die seats and recesses; drill mounting holes; mill mounting pads." The work performed on the set shown here is an example of the machining operations that Danly can do for you while your die set is in process. In many cases this necessary machining can be done on the same setup as standard operations on the die set, thereby minimizing setup and handling time.

Additional machining may be specified on any "special" including M-K and A-S sets which can be ordered directly from the Danly Catalog.

This Danly service is especially valuable on large sets. Milling, drilling and boring operations, so easily handled here may cause difficulty in the die shop or your own tool room where equipment is not specifically suited to large work.

Investigate this time saving and cost cutting service. On your next special die set order consider Danly's service for those "extra" operations that can be handled here. Your die set will be delivered "ready for mounting the dies."



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DANLY *Special* DIE SETS

MACHINED TO YOUR SPECIFICATIONS

American Machinist's Spot NEWS OF METALWORKING

Comparative labor peace is expected until next spring. The main exception involves the railroad issue. Railroad discussions, now in the machinery of the Railway Labor Act, won't reach a crisis until November. Other strikes will bob up, but they will be confined mostly to local situations rather than having national significance.

Price reductions are real news in these days of soaring costs. That's why an announcement by a Monroe, Mich., auto company drew automotive trade interest. The firm slashed the price of its recently developed tractor seat by about 20%. Improved manufacturing methods and volume orders were cited as reason for the cut.

Long-term controls to prevent the rearmament of Japan probably will take three forms: limitation of steel production to 3.5 million tons annually; limitation of petroleum refining to 2.1 million kiloliters per year; and limitation of speed and size of merchant ships.

President Truman's pocket-veto of the Republican legislation for a National Science Foundation appears to have stymied this project for at least several years. It has been felt there is no lack of money at this time for science. But a stronger move for a science foundation will undoubtedly develop.

With no visible signs of a decrease in construction costs, some firms are going ahead with their expansion plans while others are delaying programs for further study. Signs point to further increases in construction costs. This might influence many companies to go ahead with plans held in abeyance.

> **Export controls will be slapped on steel again, effective Oct. 1 and tighter than ever since the war. Lumping orders under permits will be forbidden. The Government will ask not only what country the order is going to, but what each consignee plans to do with the steel. Commerce Department's Office of International Trade will handle the controls.**

The Prague International Motor Show (Oct. 18-28) has already signed up some 90 exhibitors. These include all Czechoslovak motor manufacturing firms, also coach builders, rubber works, auto accessory manufacturers, and accumulator makers. It is expected that 12 U.S.A. motor manufacturers will exhibit along with four British, two French and one Italian firms.

WAA's 17½% discount on certain types of surplus machine tools purchased for resale has been extended to all standard general-purpose machine tools except those in short supply. Some 1400 "approved dealer" agreements are canceled effective Aug. 31. Such dealers may become eligible for the discount if items are for resale.

Italian and French steel and electric industries are getting together in hopes of reaching an understanding. Representatives will discuss equitable operations to overcome competitive pitfalls. Italian steel emissaries are seeking closer cooperation with the American steel industry.

Interest in the 1947 Machine Tool Show surpasses even the most optimistic anticipations of earlier predictions. Visitors will be impressed with the volume of new machines equipped with electronic controls and automatic operations. Some of the electronic control systems are as large as the machines they operate.

Shortages of material are providing excess shop capacity in many big manufacturing plants. One automobile firm, unable to get sufficient material for its own production, is using its steel forge shop for meeting more than $2½ million in forging orders from outside manufacturers.

Congressional approval for a $26,750,000 aeronautical turbine laboratory is being sought by the Navy. The Bureau of Aeronautics is a proponent. The laboratory would be used to test jet-propulsion aircraft engines. Full-scale engines would be tested under simulated altitude conditions.

Photos courtesy of Racine Tool & Machine Co.

RUST AND SLUDGE are major causes of stoppages in hydraulic mechanisms. You can prevent both by using *Texaco Regal Oils* (*R & O*)—turbine-grade oils specially inhibited against rust and oxidation, and processed to prevent foaming. They'll assure you smoother, more dependable operation and lower maintenance costs.

One user, for example, reports that *Regal Oils* (*R & O*) have doubled the time between oil replacements and eliminated earlier troubles with oil varnish deposits. Another user has had *Regal Oils* (*R & O*) in service for over a year without a single shutdown due to failure of hydraulic units.

These reports on the outstanding performance of *Texaco Regal Oils* (*R & O*) are echoed everywhere. Leading hydraulic equipment manufacturers recommend *Texaco Regal Oils* (*R & O*) and many ship their units filled with them.

You can get *Regal Oils* (*R & O*) in viscosities for every type and size of hydraulic mechanism. For full information, call the nearest of the more than 2500 Texaco distributing plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, New York.

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TEXACO Regal Oils (R&O)

FOR ALL HYDRAULIC UNITS

Tune in...TEXACO STAR THEATRE presents the NEW TONY MARTIN SHOW every Sunday night. See newspaper for time and station.

American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

Time for Restraint

"The Taft-Hartley Act has imposed upon American workers and their unions untold ills and hardships which threaten their living and working standards."

This utterance is not that of an irresponsible local union leader. It is a direct "quote" from Philip Murray, CIO president, on the front page of the August issue of "Steel Labor."

It differs only in slight degree from the publicized comments of other national union officers. These comments give the impression that the new labor law is a "slave-labor" law, that it bends unions to the will of employers, that its intent is to destroy unionism.

This sort of guff, dished out generously in editorial pages of labor papers, in speeches of union leaders and in union press conferences, is injurious to management-labor relations.

The Taft-Hartley Act is the answer of our national legislature to the epidemic of strikes last year and to monopolistic practices of unions.

It is a moderate law. It is less stringent upon unions than many people advocated. It seeks to restore to management certain rights of which it was deprived by the Wagner Act.

It strives for balance between management and unions in collective bargaining. The setup heretofore has been loaded in favor of labor.

The American people would like to see the new law given a chance to work. It probably has some weaknesses. It has certain controversial provisions which the courts probably will have to interpret. Later on, amendments may be desirable as experience reveals defects.

Meanwhile both management and labor should exercise restraint in their actions and statements regarding the new law.

Employers should not try to use the law's technicalities to gain sharp advantages over unions. Those who do will precipitate strife. A "get-tough" policy will be disastrous.

Union leaders, in turn, will do a disservice to their members and to the nation if they devote all their waking hours to figuring out how to beat the new law.

Strikes directly caused by the union's insistence upon writing into new contracts clauses which circumvent the new law will hardly arouse public support and sympathy.

We repeat—neither management nor labor can afford to be insensitive to the fact that the time for restraint is at hand.

Burnham Finney

EDITOR

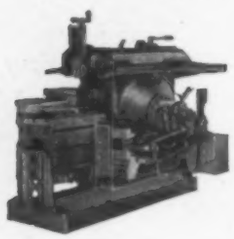
Shape - Form - Shear

...ON A "CINCINNATI"

Today Cincinnati Shapers are more efficient than ever before with heavier cutting capacities and speeds up to 200 strokes a minute on the 16"; and with a degree of *accuracy* that has never been excelled. Their power rapid traverse; multiple cam feeds; direct reading dials; and automatic oiling sell discriminating buyers. Coupled with these mechanical features are convenient controls; simplified adjustments; and means for quick and easy set-up, all of which please the operator.

Cincinnati Shapers are built in regular or universal type from 16" to 36". Ask for Cat. N-3.

See these machines under power at the Show



Cincinnati Press Brakes, the brakes of many uses, are today's machines for bending, forming, flanging, or multiple punching sheet metal. For easy fabrication, formed parts must fit; therefore *accuracy* is a fundamental advantage of these Brakes. Full-rated capacities; all-steel construction; built to withstand overload; deep bed and ram to avoid deflection are a few of the high points. These Brakes are built as accurately as a machine tool, and have unusual mechanical refinements.

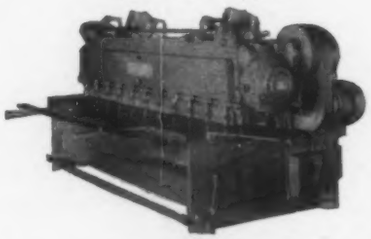
Sizes to cover practically any requirement. Ask for Cat. B-2

See these machines under power at the Show

Cincinnati All-Steel Shears offer a new degree of *accuracy* in shearing sheet metal. They cut to tolerances that take a micrometer to measure; and shear with this *accuracy* at high speed. They shear a wide variety of material in both ferrous and non-ferrous metals. Hydraulic holddowns automatically clamp any gauge of metal with the same firm pressure; fine adjustments for the four-edge knives give more efficient use of the keen edge and longer life. Rapid, accurate gauging speeds up handling of the job.

Standard capacities of Shears range from 10 gauge to 1¼ inches. Ask for Cat. S-4.

See these machines under power at the Show



THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO U.S.A.

SHAPERS · SHEARS · BRAKES

See these machines in action at the **Machine Tool Show** Chicago, Sept. 17-26. **Booth No. 417**

Crosley Builds A 59-lb. Engine

BY CHESTER RICKER
DETROIT EDITOR

Lightweight parts — 120 of them — are brazed together at 150 points to build the Crosley engine with minimum machining

WEIGHING less than 2 lb. per hp., an automotive engine built at low enough cost to power America's lowest-priced autmobile is something to think about. Industrial applications are only limited by material and factory facilities at the present time.

The 4-cyl., overhead-valve engine is unique in having an all-steel copper-brazed cylinder block mounted on a permanent-molded crankcase of aluminum alloy. The combination provides a 59-lb. engine that has 44-cu. in. piston displacement and develops from 26.5 to 35 hp. depending on the compression ratio used. The rough cylinder block only weighs 14.8 lb., from which less than 8 oz. of metal have to be removed. About 1.8 oz. of copper in various forms is used to braze together the 120 parts which form the complete assembly.

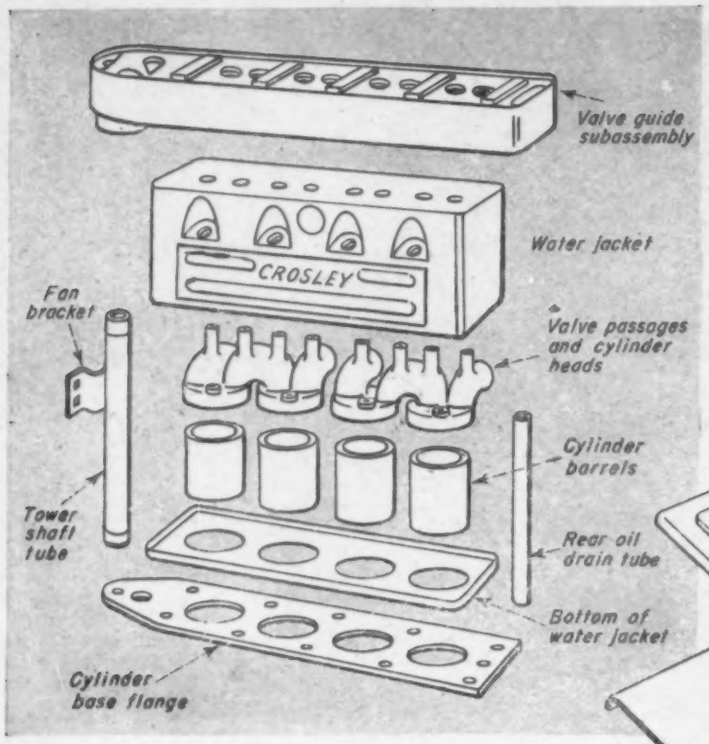
Among unusual features are the use of chrome-molybdenum SAE 4140 steel cylinder barrels that harden to 280 Brinell. The same material is used for the valve-tappet guides above the cylinder head. The valve-seat inserts are of chrome-vanadium tungsten steel that come out of the furnace at 450 Brinell.

Major parts of the engine block are made from 20-gage SAE 1010 deep-drawing steel. The base flange is 0.25 in. thick of the same material. Split aluminum bearings bolted to the top of the engine carry the camshaft. The crankshaft has five bearings, is completely counterbalanced, and made from a cast-iron alloy. The rough crankcase casting, made from "355-T-7" aluminum alloy, weighs 7.75 lb.

Composite valves are used with heads of 20-12 chrome-nickel and SAE 2140 stems that are flame-hardened on the tip. All the main and connecting rod bearings are of the half-shell precision type for easy service. Piston pins float in the aluminum piston and rod bushing. Altogether the Crosley engine is one of the most revolutionary developments that has come out of war experience. Photographs and sketches in this story touch high spots of the cylinder fabrication and machining.

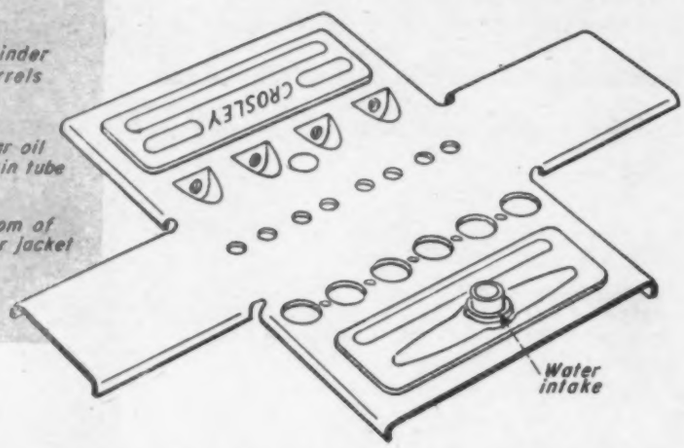
BRAZED ENGINE (not including electrical equipment, carburetor, fan, belt and flywheel) weighing only 59 lb. is held by Powel Crosley, Jr., President of Crosley Motors, Inc.

CYLINDER BARRELS and dual-head sub-assemblies meet in this arc-welding booth. They are clamped together in pairs by an air cylinder while the welder tacks the head and cylinder barrels together. The assembly is then slipped to the right, reclamped and the other two barrels are welded

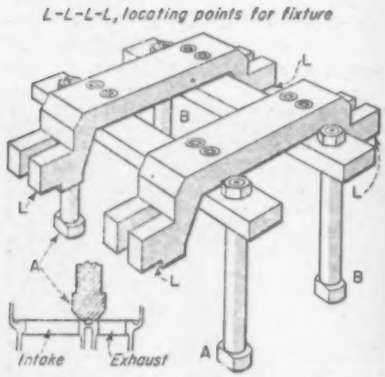


CYLINDER-BLOCK PARTS are held in place before brazing by crimping, staking, swedging and welding. Light-walled alloy-steel tubing is used for cylinders and cam follower guides and sheet-steel stampings for the cylinder heads, intake and exhaust, valve cases, water jackets

WATER JACKET is made from 20-gage, deep-drawing SAE 1010 steel. First operation is to form the bosses and punch holes as shown here. Water baffle is spotwelded on the inside and sides are folded to box shape. A thin tape of copper is inserted in joints and corners are spotwelded in place

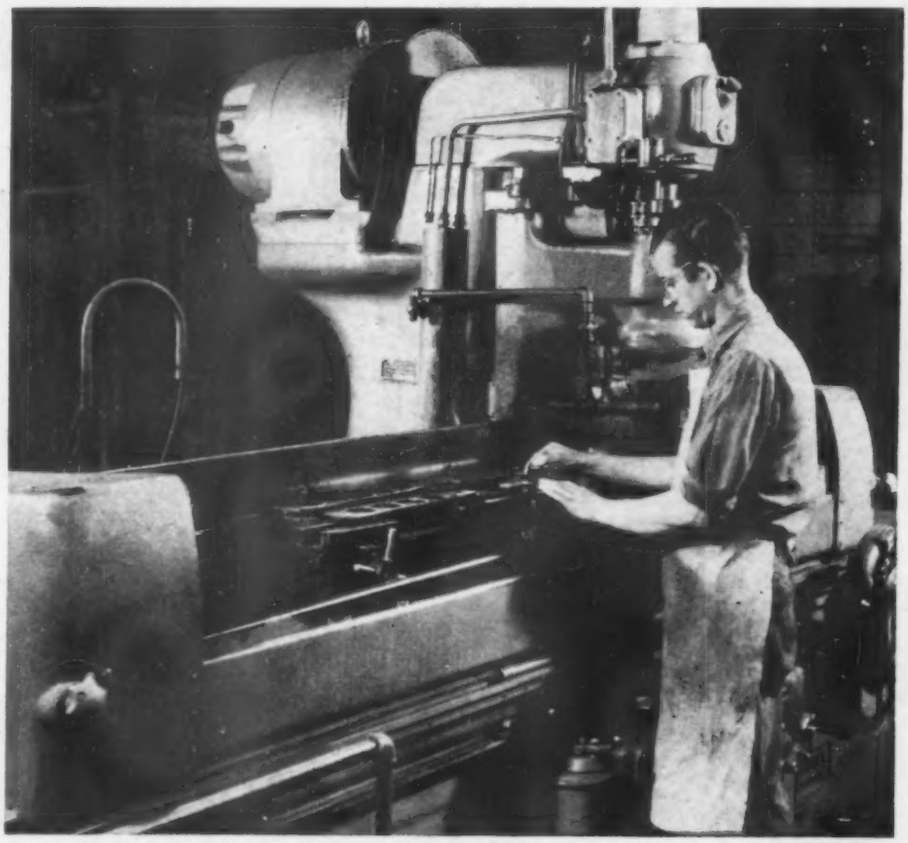


CROSLEY ENGINE continued

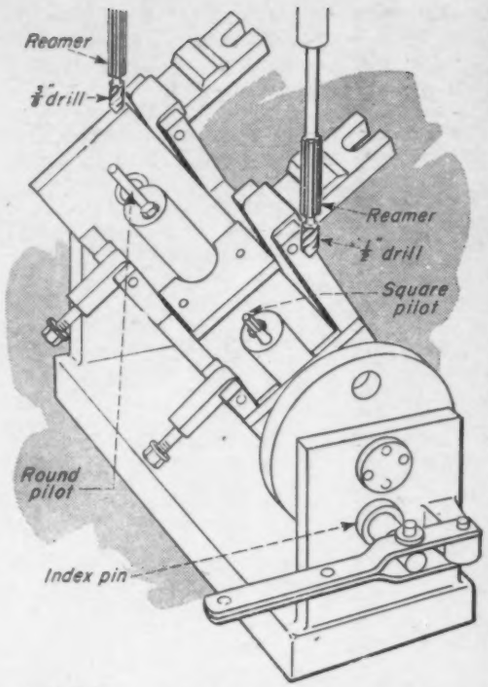


A-A, locating pins for one cylinder
B-B, locating pins for second cylinder

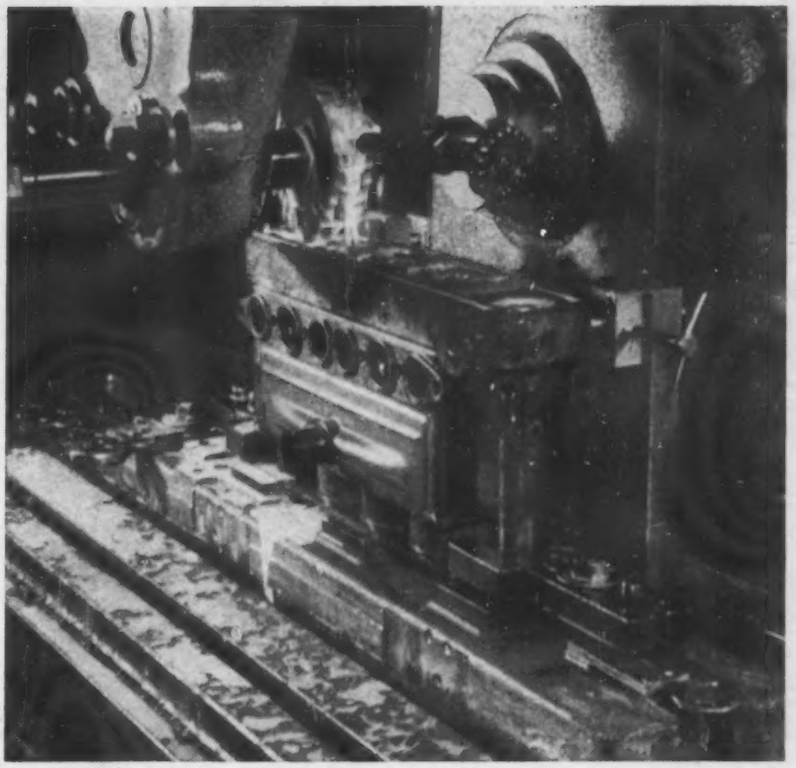
LOCATING FIXTURES for the grinding operation position the blocks for grinding. Blocks are then clamped on ends and sides and the fixture removed. Fixtures are positioned by locating points *L*. Pins *A* and *B* fit against the bridge between intake and exhaust ports in the end cylinders of each block. The spring-loaded pins in the bottom of the holding fixture push the engine block up against *A* and *B*. In this position the blocks are clamped, assuring uniform compression ratios and over-all length of the cylinder barrel



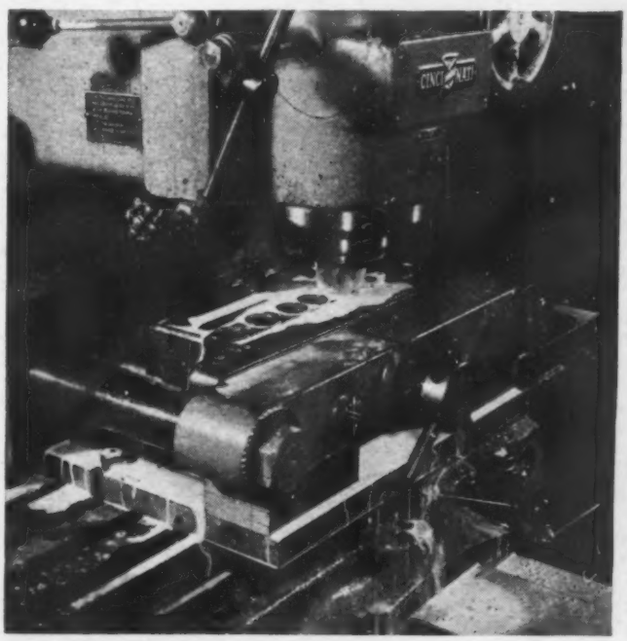
FOUR CYLINDER BLOCKS are ground at a time on this Pratt & Whitney. Base of the cylinders is finished and all subsequent operations are located from this surface. Two spring-loaded pins in the bottom of the fixture push the blocks upward against locating fixture at left



BOX JIG and roll-over fixture is for drilling and reaming two locating holes in the fixture base flange. These holes serve in conjunction with face of the base already ground for locating subsequent operations. The cylinder block goes into the fixture base down and rests on two blocks at the bottom. Two locating pins (one round and one square) enter front and rear exhaust-valve guides to position the block. After cylinder block is clamped in place, the fixture is turned over so the combined drills and reamers can be guided through the cylinder flange. New holes are drilled to avoid runout as might occur if they had been prepunched off center

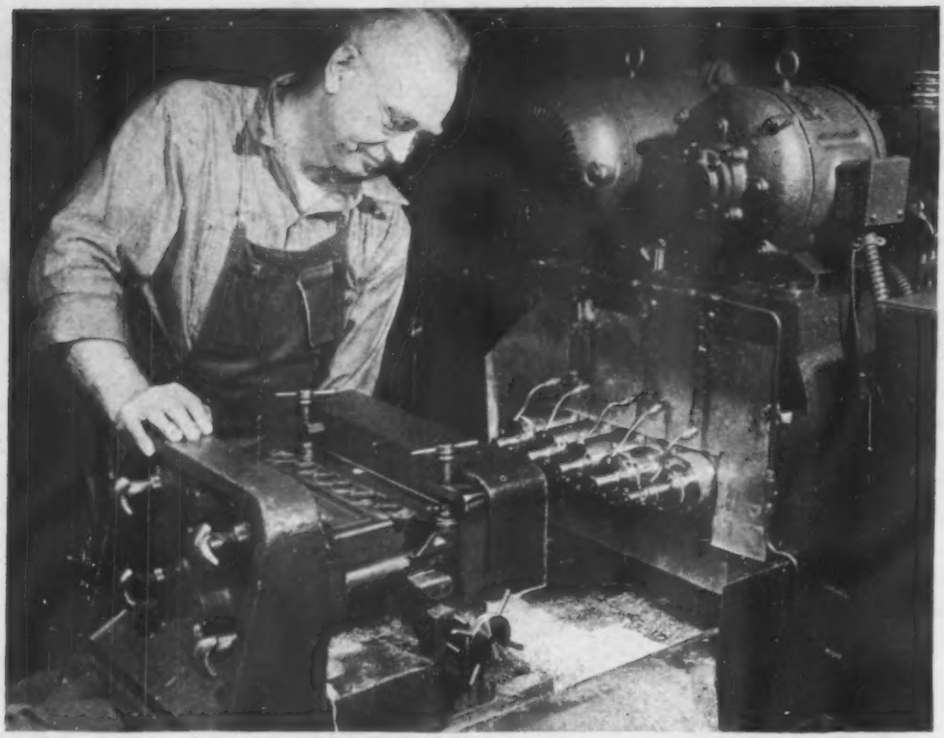


FIRST MACHINING OPERATION after locating points have been established is milling the slot in camshaft pillow blocks. No. 3 Cincinnati miller with multiple-tooth cutter climb mills the slot which aligns camshaft aluminum bearings on top of the cylinder block

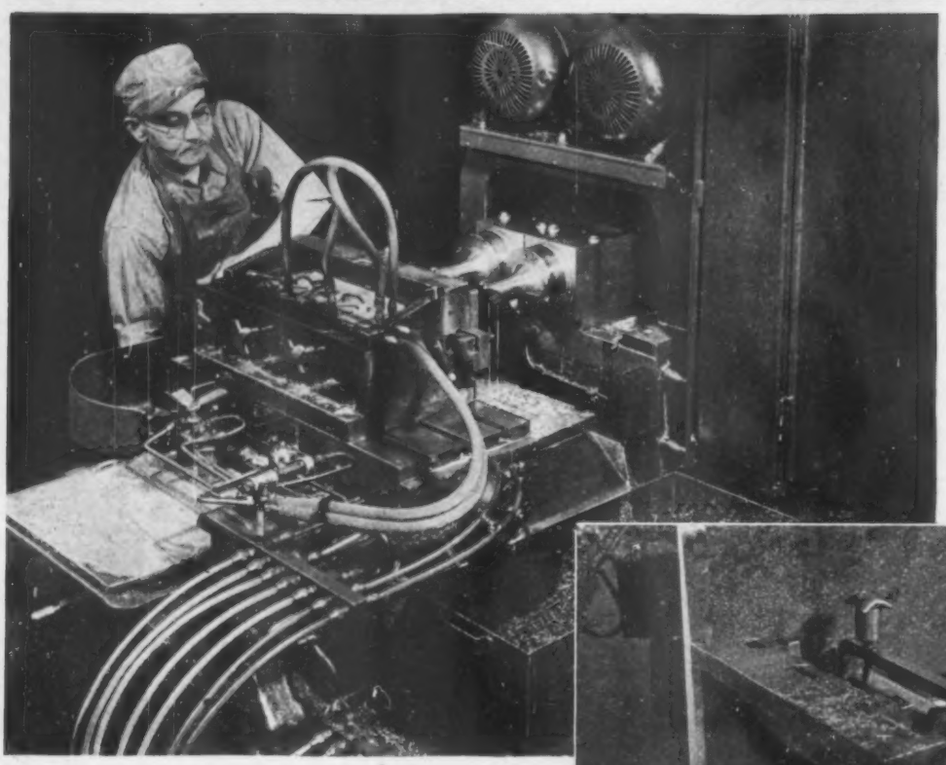


VALVE PORTS on the side of the cylinder block are cleaned up on an end mill. Originally thought unnecessary because of accurate assembly there is just sufficient warpage in heat-treatment to require this cleanup

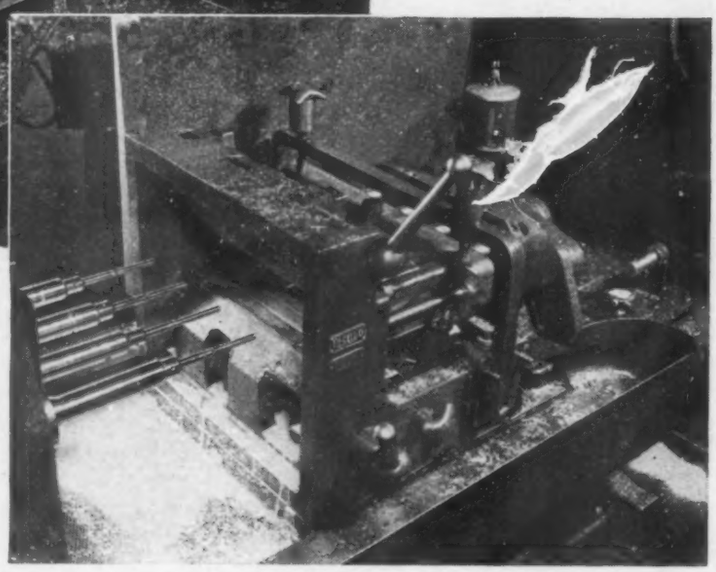
ROUGH-BORING MACHINE bores out four of the valve-tappet guides and drills the tower-shaft bushing hole. The bushing is pressed in place, after which a second boring machine bores the other four guides



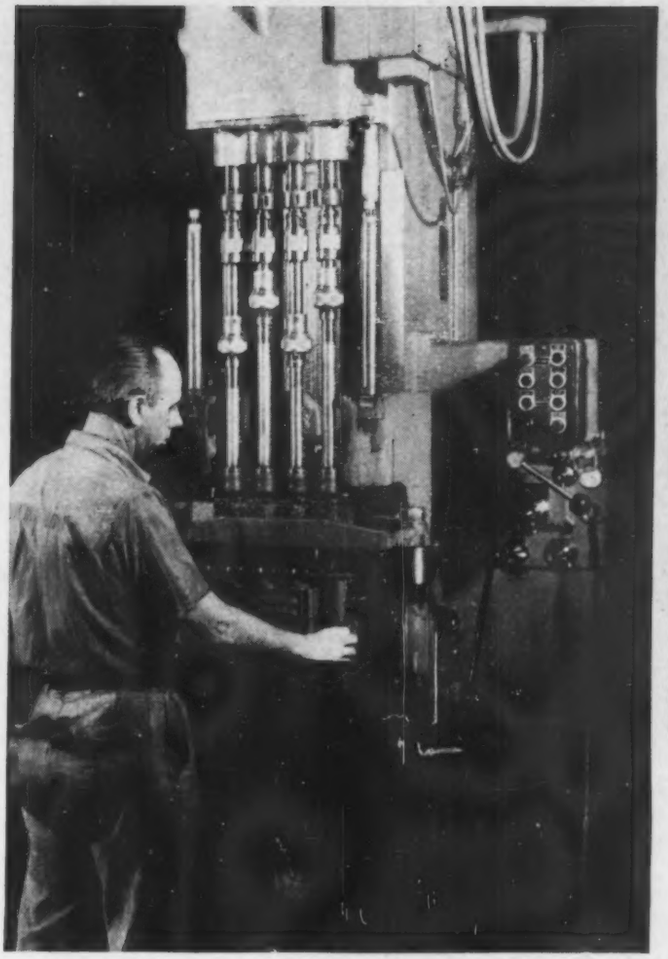
VALVE GUIDES and tower-shaft bushing are finished in this Ex-Cell-O precision-boring machine employing carbide-tipped tools. The guides, which are hardened to 450 Brinell, receive their final finish here. Fixture is very heavy to insure accuracy and good finish



FINE COILED CHIPS of hardened steel would scratch the fine surface of the cylinder bore. Carbide-tipped boring bars have been stopped so the special chip-breaker boring bars can be seen. Cylinders are 3 in. apart. Boring bars on 6-in. centers in two machines have fixtures arranged to bore one pair of cylinders on each



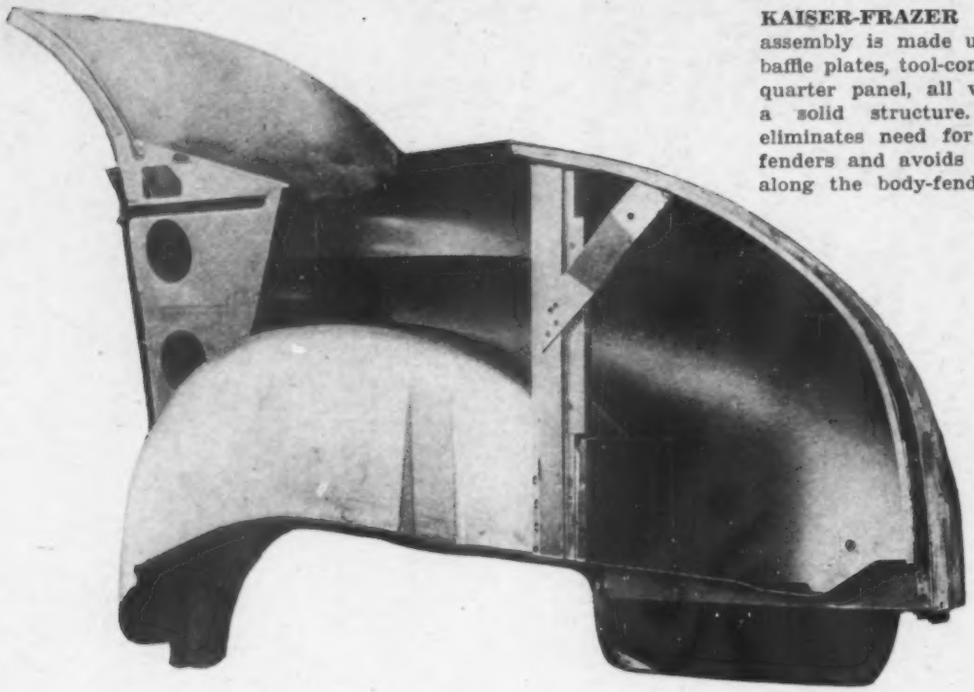
TWO FOUR-SPINDLE BORING MACHINES finish the valve guides and valve seats. Boring bars piloted at the outer end have carbide-tipped cutters for both surfaces. Entering through the cylinder bore they finish the valve-guide hole, then the valve seat. One machine takes valves 1, 3, 5 and 7; other 2, 4, 6 and 8



ALL EIGHT VALVE SEATS are finished in one setup on this Gray valve-seat grinder. Because spacing of the valve centers is exactly symmetrical, it is possible to mount the engine on a turntable fixture so that after four seats have been ground the fixture can be given a half turn to bring the other seats into position

FINAL CYLINDER FINISH is applied in a Micromatic 4-spindle hone. Cylinder block is mounted in the fixture and the four cylinders are honed simultaneously

ASSEMBLY BEGINS with the 7.75-lb. aluminum crankcase. Present capacity is about 20 engines per hour, limited by shop capacity. Plans are underway to enlarge the shop



KAISER-FRAZER rear quarter-panel assembly is made up of wheel housing, baffle plates, tool-compartment panel and quarter panel, all welded together into a solid structure. This construction eliminates need for bolting on of rear fenders and avoids a corrosion problem along the body-fender seam

Spot Welding Mass-Produces Body Panels

CONSTRUCTION of the all-welded rear quarter panels and wheel housings of the 1947 Kaiser and Frazer automobiles is one of the first really new postwar developments in automobile-body design.

This new-type construction, which may set a pattern for the industry, eliminates the need for bolting rear fenders to the body as is done in traditional body manufacture. This historic construction has been an automotive-industry headache for years because of open seams which must be left along the edges of the body where fenders are mounted.

These seams not only make it impossible to achieve perfectly smooth, flowing body lines, but provide a corrosion problem as well. The problem results from the necessity of insulating bolted edges with a fibrous anti-squeak material, visible as beading along the exterior fender seams.

The anti-squeak strip, unfortunately, provides a trap for saltwater and other corrosive agents to which paint and metal are subject. Thus, paint deterioration and rust along these seams are common ailments after a few years of car life. But Kaiser-Frazer's new rear-quarter-panel construction eliminates these styling and corrosion difficulties.

Rear quarter panels at Kaiser-Frazer embody new design ideas made practical by an automatic spot welder with dual tooling

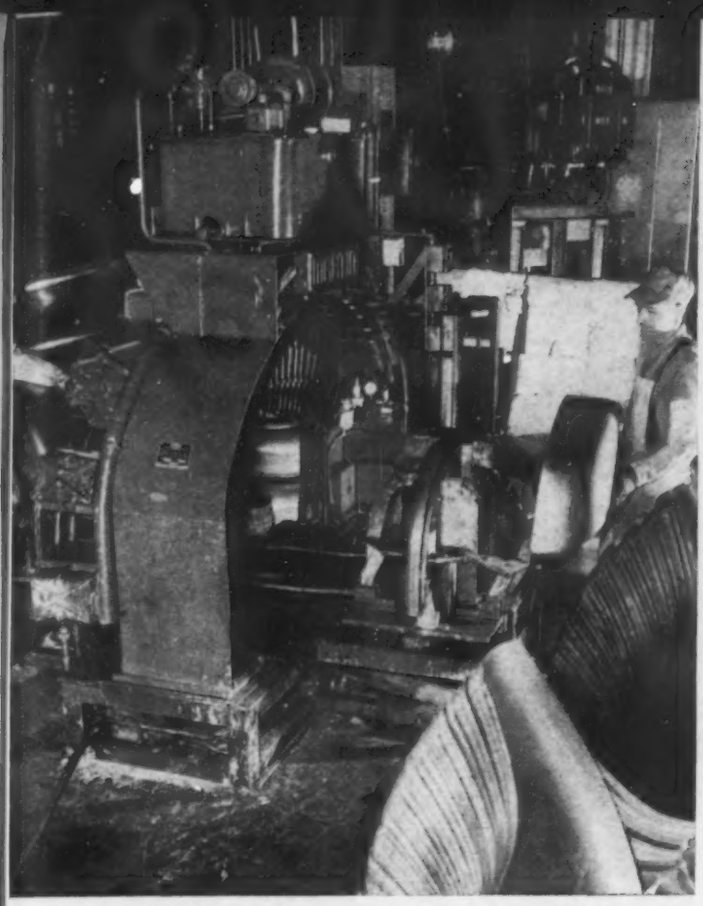
In traditional construction, quarter panels are welded to the body to serve as inner rear-wheel housings with bolted-on fenders providing the outer housings. K-F engineers designed their rear-quarter-panel assemblies so they provide, when welded to the roof panel, a sleek exterior body appearance and include interior housings for the rear wheels.

The rear-quarter-panel assembly consists of a wheel housing, baffle plates and tool-compartment panel, all welded into one solid structural assembly. Mass production of this assembly has been made possible through the development of a special multiple spot-welding machine, which turns out wheel housings at a high production rate, and by table welding fixtures in which each wheel-housing assembly is joined to a quarter panel.

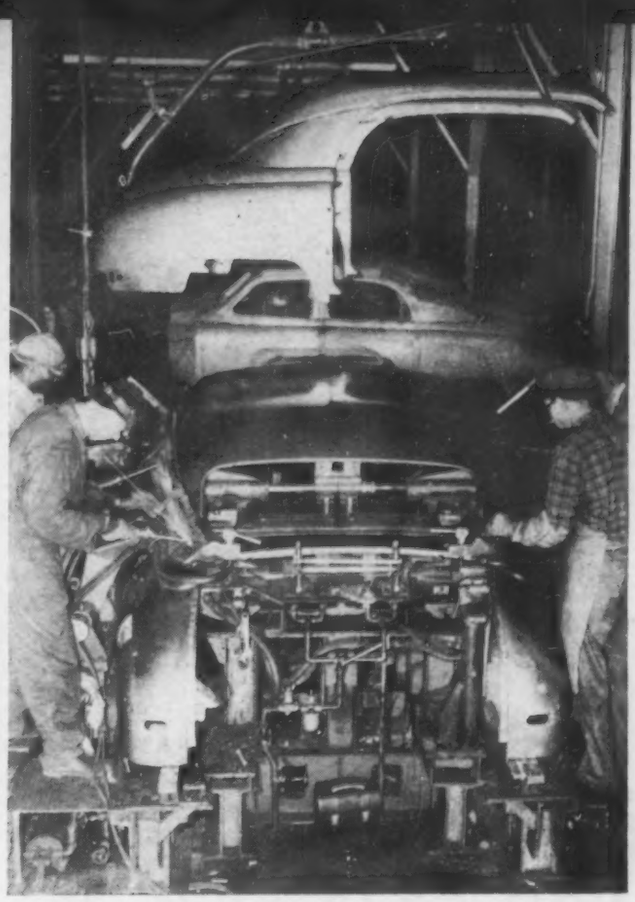
The wheel housing itself consists of two spherical halves of 18-gage steel, overlapped along their center edges and spot-welded. This operation is done in a Martin automatic machine which turns out 224 finished units an hour. The two wheel-housing halves are placed in an upright position on a sliding fixture which provides for ¾-in. overlap. Clamped in position, the assembly is carried into the machine and 28 spot-welds are applied simultaneously. The carriage fixture then automatically returns to starting position.

Dual tooling provides for operation of the machine from two sides so that while one operator removes a finished unit another loads the opposite station. The machine welds both right and left housings, the difference in the two being merely the reversed location of the two halves in the welding fixtures. Each operator turns out 112 right or left housings an hour.

The housings follow the general production flow pattern to adjacent fixtures where baffle plates and a tool-compartment panel are hand-gun welded to them. The major



WHEEL HOUSINGS are multiple spot-welded (28 welds) along overlapping edges of its two spherical halves of 18-gage steel. Dual tooling, allowing one operator to load and weld on one sliding fixture while the second operator unloads the other fixture, produces 224 wheel housings per hour. Each fixture automatically withdraws



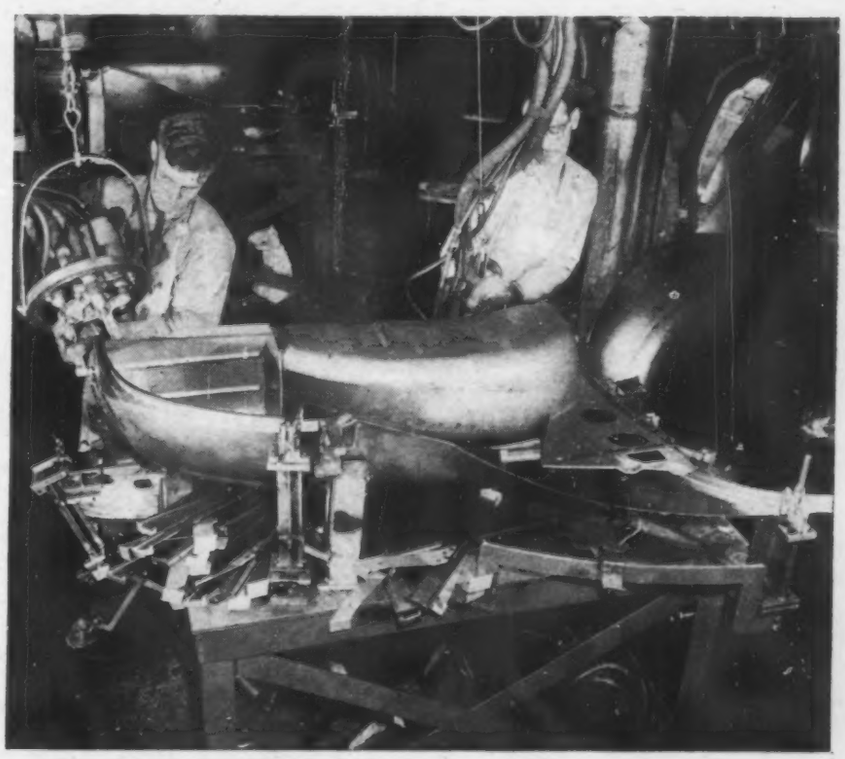
REAR-QUARTER ASSEMBLIES are joined to the roof in this "balloon" fixture, which holds the panels accurately while operators make the 44-in. panel-roof gas welds. The balloon assembly, suspended overhead, awaits lowering on the body-building line in the background where further welding operations are done

difference between the two assemblies is in the gas-tank intake opening in the left wheel-housing assembly.

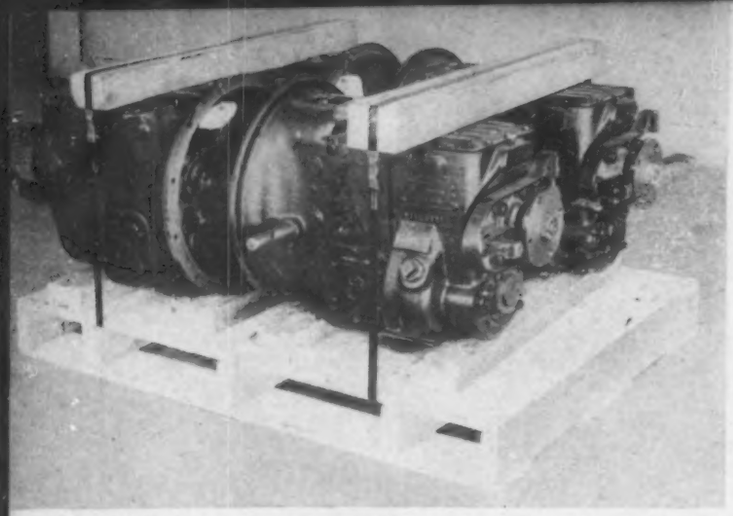
Right and left wheel-housing assemblies are then joined to their respective quarter panels in table fixtures. Each quarter panel is accurately located in the fixture and secured with clamps placed so they leave the work open for hand-gun welding. Welding guns are spring-suspended from overhead beams.

Six such welding stations are located near the balloon fixtures in which quarter-panel assemblies are joined to the roof. The 20-gage panels are located by stops and held by pneumatic cylinders and quick-acting clamps while the 44-in. gas welds are made.

When this weld is completed, the balloon assembly is lifted by crane and delivered to one of the two adjacent body-assembly lines where further welding operations join it to the floor and cowl panels. The long welds that join roof and rear quarter panels are torch-soldered and metal-finished at subsequent points on the body-building line so they become invisible.



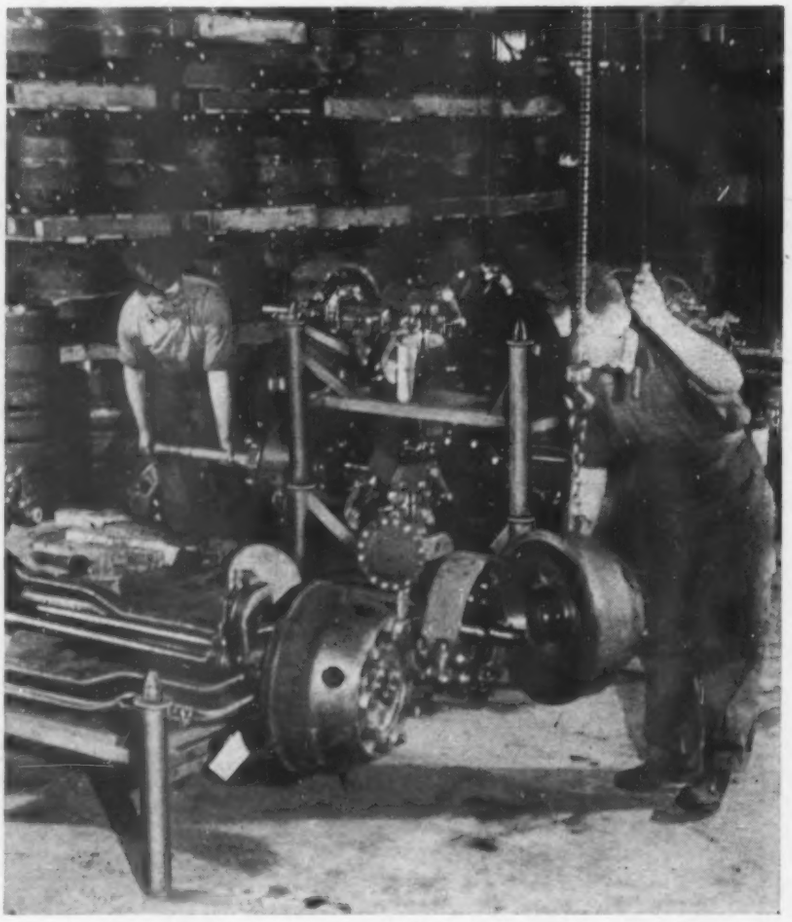
SPECIAL TABLE CLAMPS hold this right rear-quarter panel in position while the wheel housing is hand-gun welded to it. Welding of left rear-quarter panels is performed on similar fixtures



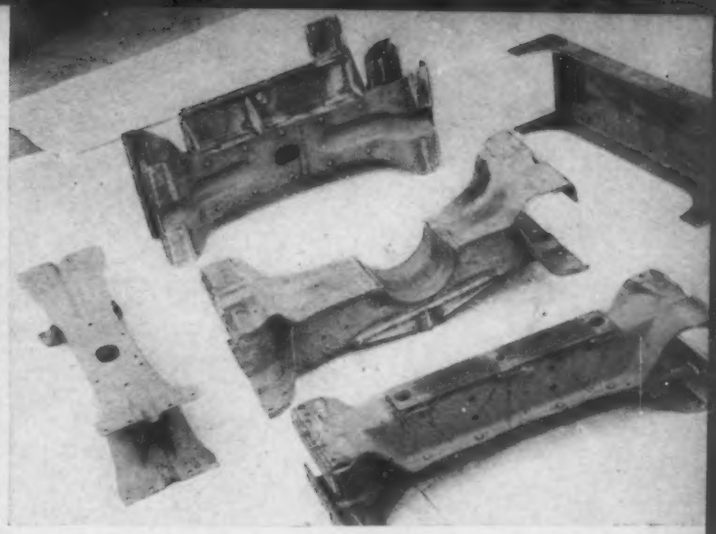
TRUCK TRANSMISSIONS are palletized for interplant shipment by strapping on standard pallets with necessary dunnage supporting the transmissions and laid crosswise across their tops or setting them into individual compartments in pallet bins which require no strapping. Either method, strapping or bin, provides safe, rapid handling and movement from subassembly to final assembly. Tiering is made easy by use of intermediate dunnage

Unit-Load Handling Protects Products

BY E. R. KLEIN, PRODUCTION ENGINEER, MACK MANUFACTURING CORPORATION

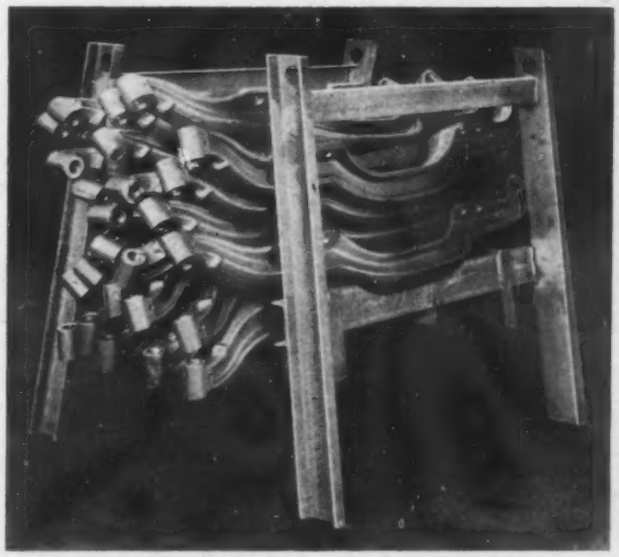


PALLET RACKS to handle different parts or assemblies have been built up of welded channel, angle and pipe. Each rack has pins on the top of vertical pipe members so the pipe feet of a similar rack can be socketed on it to save floor space. This particular pallet handles bus front axles, two at a time. Other types handle rear axles and bus transmissions. All are designed for lift-or fork-truck handling. Axle assembly is made on a heavy-duty progressive line at the end of which are stored the pallet racks. Axles are delivered to the wheel department on racks which act as work benches for assembling hubs and axle shafts. Axles then are moved through painting and delivered by trailer to assembly where they are removed for spring and wheel assembly

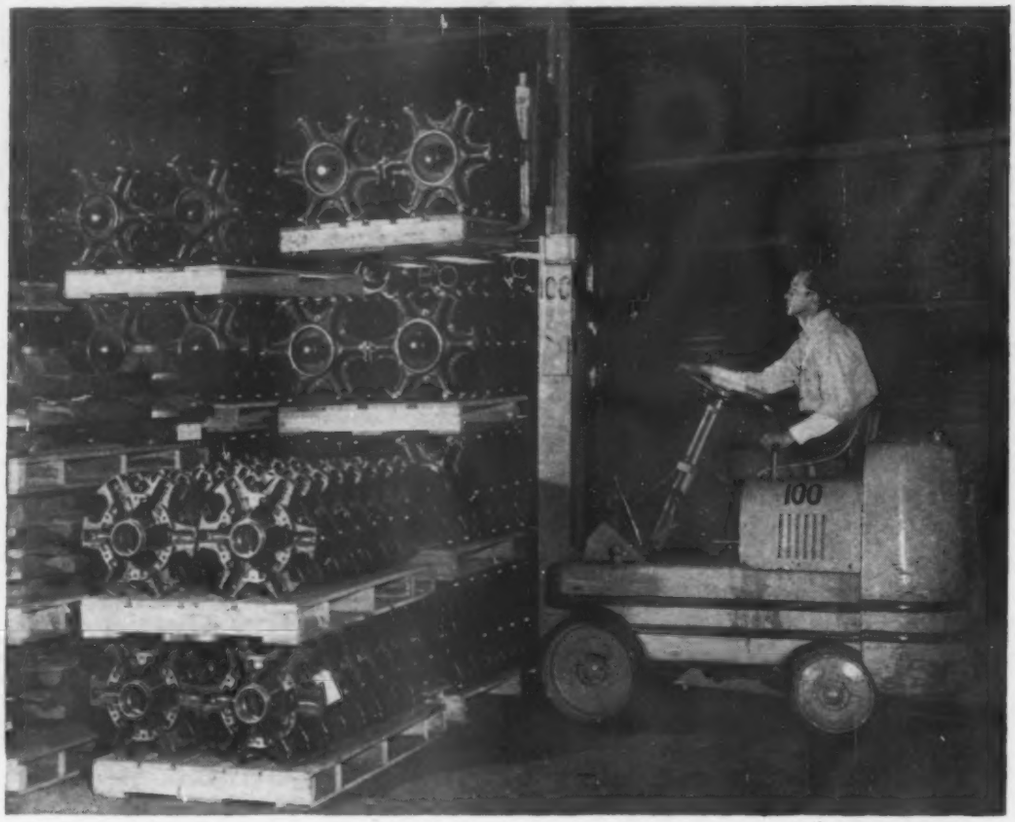


ODD-SHAPED PARTS may require considerable thought and ingenuity for successful palletization. Proper nesting, balance and strapping must be worked out for optimum safety of men and materials. A dangerous pallet load is worse than none. But experimenting, with either full-sized or model parts, will develop loads of parts, such as these truck cross-members, that might appear, at first glance, to be too irregular for palletizing

Truck and bus production, in two plants 1½ mi. apart, depends on safe, economical and quick delivery of parts to assembly. Many special racks and pallets have eased this delivery job



FRONT AXLE-BEDS are loaded at box-car door into portable telescoping tiering racks that can be handled by lift or fork truck or by crane. Tapered leg design steers tiered loads into place. From storage, axle-beds are routed to heat treat by rack full, processed, replaced in rack and delivered to machine shop where they are tiered 3-high by crane. At end of "in-line" machining operations, they are reracked, moved by trailer to assembly-line storage area, tiered 3-high by fork truck and finally moved by rack load to assembly. This portable tiering rack saves six hand pilings, or a total of 150 handlings in one load of 25 beds



TRUCK WHEELS, irregular in shape and difficult to handle, are stacked 16 to the pallet by wiring opposite sides through stud holes. Tiering, which requires no extra dunnage even though bottom pallet boards are open for hand-truck wheels, is safe even 4-high

UNIT LOADS can be made up without pallets by stacking parts on dunnage strips. These axle housings are packaged in the machine shop and delivered to assembly in batches of eight. Truck springs, heavy and hard to handle at 140 lb. each, are stacked by vendors, 25 to the load, on 4x4's with spacers between layers. Result—saving in trailer unloading time of over 75%, plus no back-breaking work

SMALLER TRANSMISSIONS can be stacked upright on standard pallets. As the emergency brake bands could not support any load, a special wooden block is set inside each band to carry dunnage strips and tiered loads. Such auxiliary blocks permit palletizing many irregular shapes that otherwise could not be tiered with safety to men and parts

Air Presses Lighten The Job

The day of the cumbersome kick press is over. Light, automatic, safe, air presses speed work and improve morale by cutting fatigue

BY T. W. SHENTON
Chief Engineer,
Arrow, Hart & Hegeman Mfg. Co.

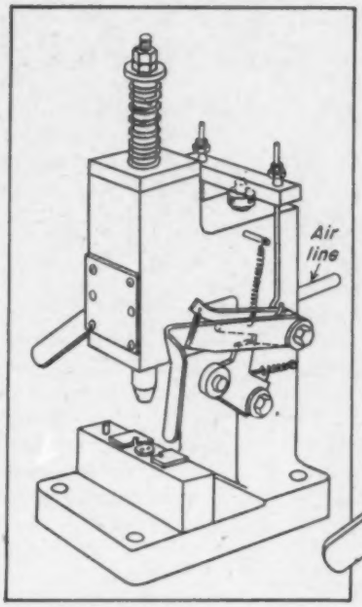
IMPROVEMENTS in plant and equipment mean improvements in working conditions and worker morale, as well as increased production efficiency, and all these factors are directly reflected in the way of life of the people in the plant.

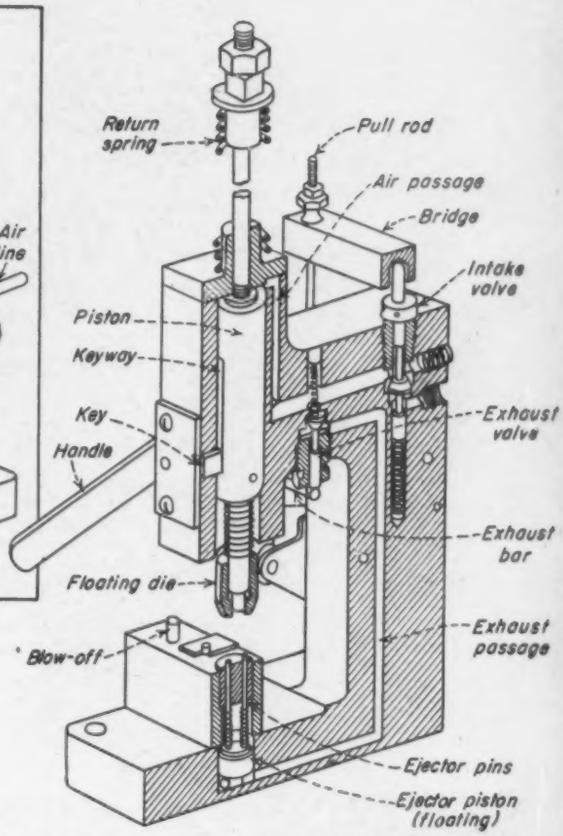
Formerly, a large number of riveting, staking, and locking operations on Arrow, Hart & Hegeman's lines of electrical switches for appliances were done on kick presses, some on toggle presses. Operators objected to the fatigue of one and the bulk of the other. As a consequence, kick presses were modernized by cutting off the lower limb and installing air operating cylinders with foot controls.

Many older presses, however, are now being replaced by a company-designed air press which is extremely compact, fast-acting and safe. It has won acceptance by operators because of its speed (most operations are piecework) and ease of operation, by the company for accuracy, blow control and easy maintenance.

Safety is achieved with two-hand operation. Both handles must be depressed and released every cycle, and the press won't operate with one handle tied down. Depressing one handle tilts the intake bridge and the exhaust valve bar; this motion is enough to allow the exhaust valve to close, but not enough to contact the floating, spherical-headed intake valve. Depressing the other handle trips the other cam and opens the intake valve smartly, but raising one handle alone, though it again allows the intake to close, will not lift the exhaust valve so the piston can't rise until the other handle is released too.

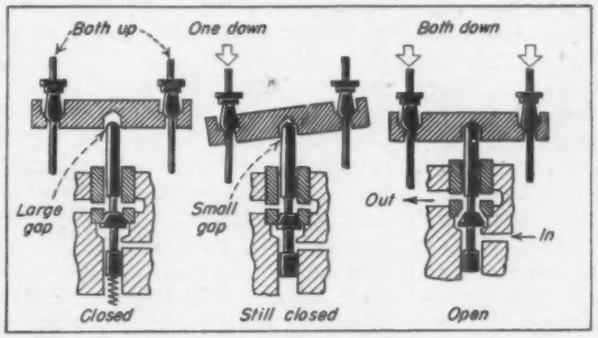
Patents have been applied for on the particular design shown, but the operating principle is broadly applicable to anyone's light press operations.

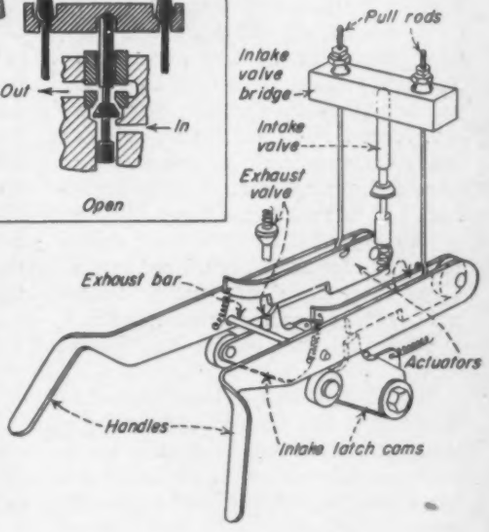




Air press, 13-in high, 12-in. wide, has two operating handles, both of which must be depressed to drop the hammer-piston. This is the larger of two designs

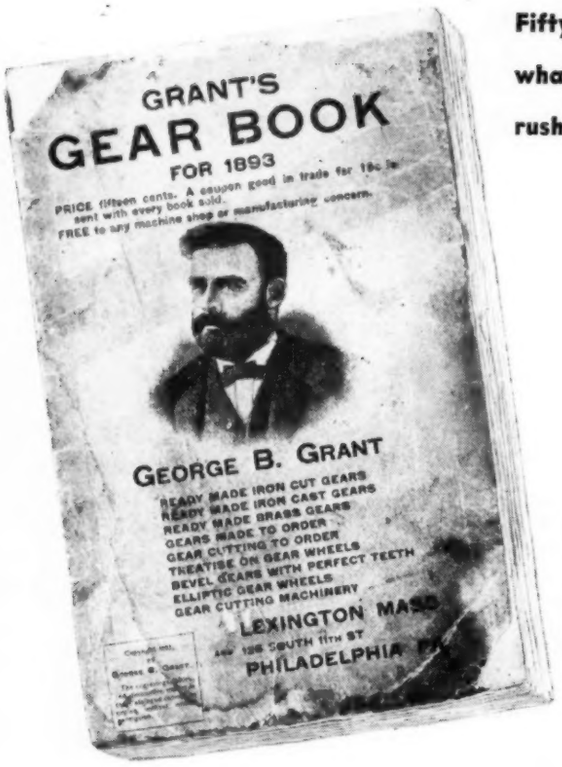
Piston is normally up and air pressure must overcome the light return spring which just over-counterbalances the weight of piston and its floating punch. Air enters back of press frame through drilled passages and is admitted to the piston by a snap-action poppet valve. Another valve releases the air pressure to the atmosphere, allowing the piston to rise, but only after it exhausts through the die, ejecting the part from the press





Operating Cycle — Depressing both handles moves the two cams until the actuators clear, at which point they drop suddenly, pulling the pull rods, bridge and intake valve with them. Air then rushes into the cylinders and drives the piston with a fast stroke. Releasing the handles allows the return springs to lift them and the exhaust valve bar, opening the (normally open) exhaust valve

Rugged Gear Man Grant...


GRANT'S
GEAR BOOK
FOR 1893
PRICE fifteen cents. A coupon good in trade for 15c. is sent with every book sold.
FREE to any machine shop or manufacturing concern.
GEORGE B. GRANT
READY MADE IRON CUT GEARS
READY MADE IRON CAST GEARS
READY MADE BRASS GEARS
GEARS MADE TO ORDER
GEAR CUTTING TO ORDER
TREATISE ON GEAR WHEELS
BEVEL GEARS WITH PERFECT TEETH
ELLIPTIC GEAR WHEELS
GEAR CUTTING MACHINERY
LEXINGTON MASS
PHILADELPHIA

Fifty-four years ago, George B. Grant said what he thought about materials, prices, freight, and rush jobs. These excerpts are amusing—and startling

George B. Grant is a legendary figure in the jobbing-gear business, the man who founded Lexington Gear Works, Grant Gear Works, Philadelphia Gear Works and Boston Gear Works, the latter three still operating. He is also remembered as a man who said and wrote what he thought, without our modern fear of straining customer relations. Here are some examples, from his "Gear Book for 1893," which Russell Ball, president of Philly Gear, loaned us. To avoid any difficulties on unit prices and rush deliveries, he writes:

"Please Don't. Don't ask a price on one gear and say you are going to have a thousand later on. It is harmless, but it makes me tired.

"Hurry Jobs. Don't expect me to hurry for I won't hurry. I put everything through as quickly as possible with safety and certainty. I know you won't hurry to pay for spoiled work."

"The list price is a humbug unless firmly adhered to, and list prices on iron gears are not adhered to. It takes no longer to write for a net price than for the discount on the list price." And again: "I have abandoned the common practice of a fixed list and a variable discount and instead have adopted the method of definite net prices. On receipt of a definite list of gears wanted, giving the list numbers of the gears, I will promptly return a definite "net price" at which I will sell that whole lot within one month. I will send separate prices on lots of cut and cast gears, but I will not price the separate gears of a lot. The net price will be lower for a large lot than for a small one, and lower to a customer who sends cash or is known to pay promptly than to one who is likely to defer payment."

"To a new customer who is not familiar with the quality of my list goods, but not to one who knows what they are, I allow the privilege of immediate return at his own expense. The return must be immediate, and I cannot permit the slightest use or service. Under no circumstances can I permit the return of special gears, as they are wholly unsalable."

On page 1, Mr. Grant writes unequivocally: *"Credit* is determined by Bradstreet's Mercantile Reports. If that report is good I am willing to run an account; but if there is no report, or if it is not good, I positively will not trust. *Terms* to a business concern that is well rated in Bradstreet's are thirty days, and I draw at sight to settle an overdue account."

To be sure there is no misunderstanding, he writes, in his last-page "Remarks": *"Loans.* If a stranger should call at your office and request a loan of ten dollars for a month he would not be very likely to get it. If you order my goods, and your name is not in Bradstreet's, you are a stranger to me. A ledger account is a loan for a month. *Drafts.* Don't get mad because I draw on you. Some concerns like to pay by draft, and others do not. I do not know whether you do or not."

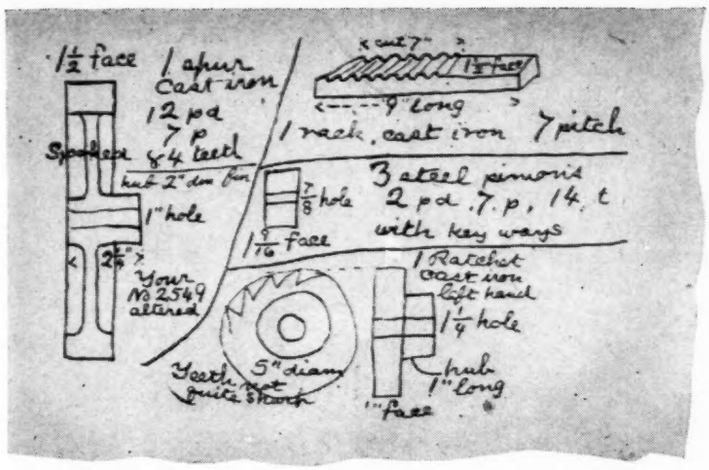
Mr. Grant had small patience with incomplete information supplied with orders or requests for bids. Insufficient data, he explains, cause "blunders" and "needless correspondence." Regarding drawings, he says flatly: "I am not responsible for errors, even my own, that can be avoided by furnishing a complete specification with working drawings." And, "Blanks sent to me are assumed to be properly shaped." Again, "I am not responsible for my errors of judgment concerning details that are left to my selection. State exactly what you want and you will be suited every time."

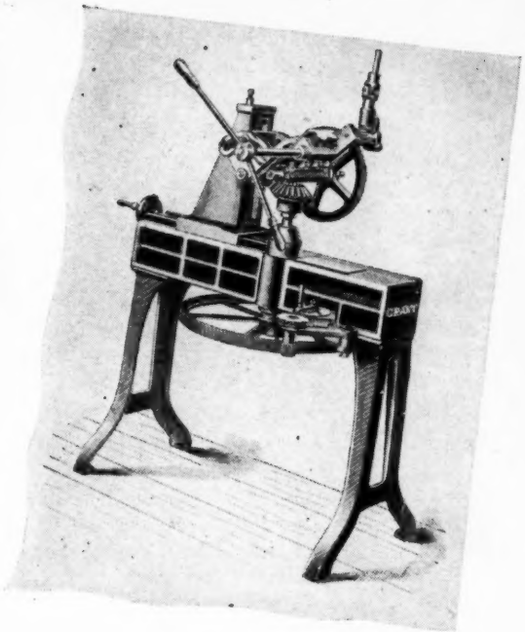
Rawhide Gears

Apparently, there was "much ignorance" about rawhide gears, for "manufacturers of rawhide and fibre make claims that are not true; sometimes going so far as to claim that the material is more durable than steel, and none of them taking pains to represent the matter in its true shape. The truth is that fibre is hard and also elastic and tough, but it is not as hard as iron or as tough as steel, and is fitted for use in place of metal only when the speed is sigh, and strain and shock are small . . . we do not warrant them for hard service or great durability. We cannot undertake to meet the rediculous claims of makers of similar articles, or to guarantee great mileage or longer service."

Again to avoid any misundertanding of his opinions, he remarks: "Don't believe any one who says rawhide is more durable than steel. Under special conditions it is, but under usual conditions it is not."

In case you may misinterpret and





Mr. Grant, in his campaign against incomplete and inadequate instructions, captioned this drawing, on the inside front cover: "A poor drawing is better than none." Right, the Grant 24-in. gear-cutting machine, as offered in 1893

suspect bias, here's a contrasting flat statement: *"Steel Castings* are invariably full of blow holes, and it takes at least four weeks to get them. This material is often as weak as cast iron."

Another positive statement: "Involute teeth only. I decline to cut the epicycloidal tooth."

Mr. Grant's opinion of freight was not too high: "I decline to send by freight except at customer's risk of damage, loss and delay. Goods wanted in short time must go by express. I charge 25 cents cartage on freight to depot, when package weighs less than 100 lbs. *Delivery* is complete when goods are delivered to mail, express or freight here."

His "Remarks" add: "If you are patient and like to sit down and wait for things to turn up, just order a small package sent by freight."

Gear Cutter

Mr. Grant also made a 24-in. hand gear-cutter. Although he says "we believe it to be the best jobbing gear cutter on the market, and this combines all the good qualities that we know of for its size and purpose," he says flatly:

"We cannot answer inquiries as to how many gears it will cut, or how smooth it will cut the teeth, except that it is as good as any machine of its grade in all respects. The product of the jobbing gear cutter, like that of the jack knife, is entirely dependent on the skill and experience of the workman. An active man will do more work than a lazy one, and a badly made and dull cutter will not cut a good gear on this or any machine."

To indicate his optimism, and perhaps contrast his methods with the "secret" plans now so common, we quote this rubber-stamped statement on his page 1: "In 1894, I shall start a branch gear shop in the West —in Ohio, Indiana or Illinois. Write for full address." This was the Cleveland Gear Works, which was closed in the early 1900's.

Just under the title of his catalog, and above his picture, Mr. Grant states: *"Price* fifteen cents. A coupon good in trade for 15c. is sent with every book sold. FREE to any machine shop or manufacturing concern." He evaded "catalog collectors."

He also sold a "Treatise on Gears" for 60 cents with paper binding or $1 with cloth binding, on which he offered, "With every copy sold at retail I send a coupon good in trade for the full amount paid." Further: "I am so sure this book will please any one in my line of business that I refund the price paid if the book is returned promptly to me, for not one book a month is returned." Apparently he was right—the book is still being sold by Philly Gear.

In his explanation of it, he said: "It was first published as a contribution to the AMERICAN MACHINIST, and was copied in full from that paper by two English technical journals."

A GEAR IS MORE THAN A GEAR

GEORGE GRANT'S "Treatise on Gear Wheels" is still a standard text, sold by Philly Gear. Here's the introduction:

"The present object is practical, to reach and interest the man that makes the thing written of: the machinist or the millwright that makes the gear wheel, or the draftsman or foreman that directs the work, and to teach him not only how to make it, but what it is that he makes.

To most mechanics a gear is a gear.

'A yellow primrose by the shore,
A yellow primose was, to him,
And it was nothing more;'

and, in fact, the gear is often a gear and nothing more, sometimes barely that.

But, if the mechanic will look beyond the tips of his fingers, he will find that it can be something more; that it is one of the most interesting objects in the field of scientific research, and not the simplest one; that it has received the attention of many celebrated mathematicians and engineers; and that the study of its features will not only add to his practical knowledge, but also to his entertainment. There is an element in mathematics, and in its near relative, theoretical mechanics, that possesses an educating and disciplining value beyond any capacity for earning present money. The thinking, inquisitive student of the day is the successful engineer or manufacturer of the future."

We Plough Back Depreciation Dollars

BY JAMES S. KNOWLSON, PRESIDENT, STEWART-WARNER CORPORATION

As worth of old equipment trickles out of plants, equivalent dollars are reinvested in replacements. New or increased capacity comes from other funds, is not allowed to masquerade as "replacements"

A BASIC POLICY of our company for a good many years has been to make annual replacements of plant machinery and equipment in the amount of depreciation figure by which it is written down as an asset. By this we mean replacement of equipment that we already have in the shop. We do not permit the term "replacement" to be stretched to cover any form of increasing a plant's capacity. *New capacity must come from another source than the depreciation fund.*

At the root of this policy is our profound belief that depreciation charges are made against machine tools and other plant equipment because these assets actually lose value from use and obsolescence. With the worth of old equipment thus trickling continually out of our plants, we can see no justification for treating the offsetting bookkeeping charges as eligible to become dividends, surplus, plant extensions, or long-term reserves. *We actually spend these dollars for replacements.*

Perhaps this policy has been shaped to some extent by my own practical plant background. I worked in machine shops and subsequently ran my own for a good many years before I found—somewhat to my surprise—that I had become a full-time corporation executive.

Aids Cooperation

Not all of the advantages are on the side of my changed status. No matter how many reports, statistics, and other specimens of paperwork come to me now to keep me informed, they somehow never provide quite the same first-hand knowledge of shop conditions that I used to get by simply turning 180° in my office chair to the window that overlooked every machine on the floor. For that matter, neither can even the most competent personnel work give a working force of thousands of people in half a dozen big plants the same sense of closeness to the management that the boys in that little shop got by seeing the boss working in his office every time they looked up from their machines.

Stewart-Warner Corporation's policy of replacing equipment aims to spend 25% of last year's depreciation dollars in each calendar quarter. The purpose of spreading it out across the year is in part to keep relatively level the load on millwrighting and layout. But still more this method is intended to avoid spending all depreciation money early in the new fiscal year, then having a large unforeseen need pop up.

Avoid Rigid Rules

In setting our policy of using depreciation funds for replacements, we avoid getting ourselves tied up in a lot of hard-and-fast rules. It obviously would be needlessly complex and rigid to try to apply the depreciation dollars precisely to the departments or operations where they originated. To us it seems better practical management to use the money where it will yield the greatest savings or product improvements.

Every plant manager, superintendent, or foreman can be relied upon always to want new equipment far beyond the depreciation on his old. So we always know that purchase requests for machine replacements will roll up to totals in excess of money in the depreciation account.

At the upper levels of the company's management we try to help the shop people sift out their actual needs from their dreams, and thus get our purchase authorizations back into the realm of reality. Any capital expenditures of $50 or more require management authorization. The higher the figure, the higher it must go for approval. As it works out, any proposed purchase of a machine tool or major piece of mechanical-handling equipment requires my signature, so I have the fun of participating in these decisions.

In some years we borrow from one department's depreciation fund to meet a greater need in another department. Once in a great while we have to short-change one plant in favor of another—but the wronged plant manager invariably screams that he has been robbed, and we subject ourselves to this heart-breaking emotional strain only when a big profit advantage to the company can be forecast.

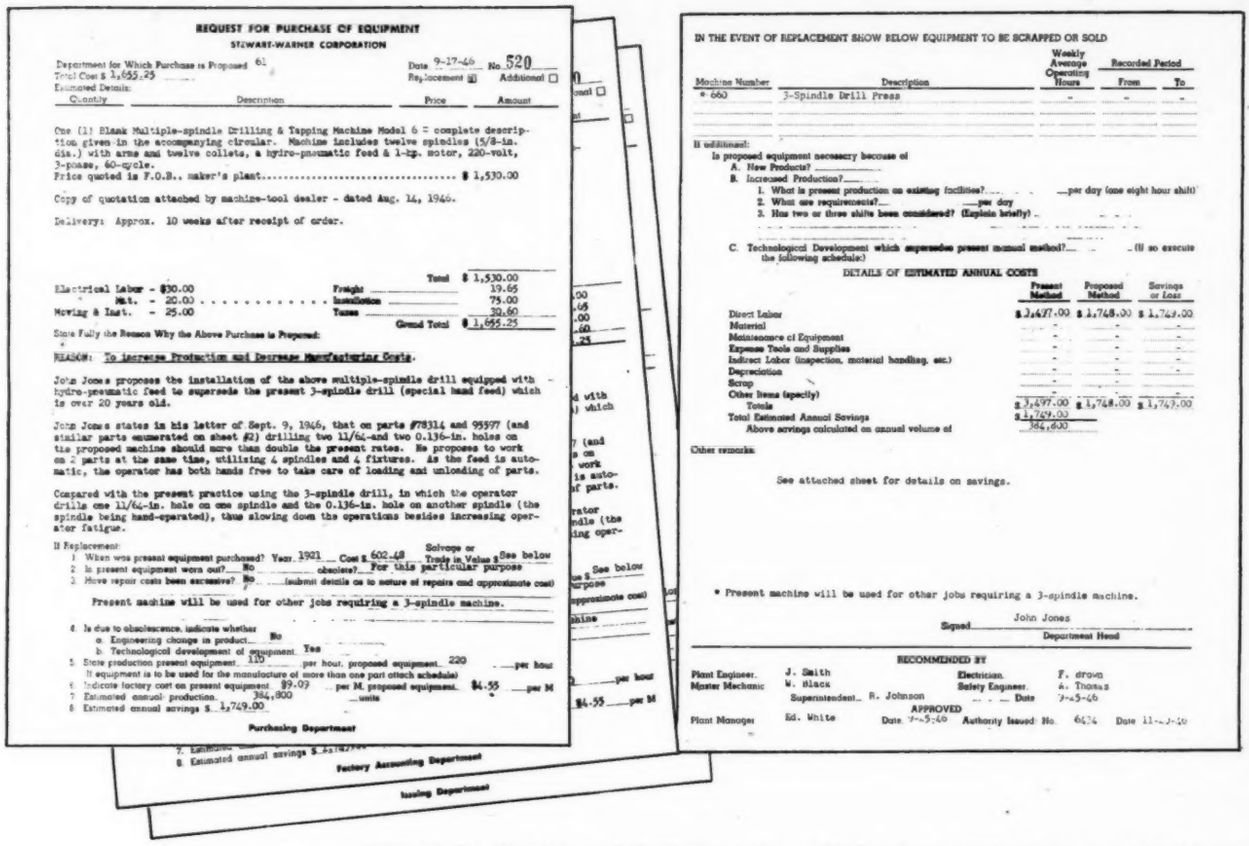
Precisely where the money will go is determined by the need and by the profit opportunity. A machine that falls short of required precision or that can no longer maintain required production rates is a first-rank candidate for retirement. Of course our replacement policy has been liberal enough for long enough so that we usually have only a few of these extreme cases.

A great deal of our replacement money is spent for reasons of obsolescence, whether caused by our own improvements in manufacturing methods or by machinery makers' betterments in their new models. In either event, we usually try out the new method before we plunge in.

An Example

Some time ago, for instance, the engineers at one plant came up with an idea for taking an operation off screw machines and putting it on headers. We bought a header to try out the idea. First results were not spectacularly good. Eventually we discovered that what was holding us back from the forecasted results was not the header itself, but rather the need to put on a production basis the manufacture of tools for use on the header. Then, with the trouble licked, we bought more headers.

Another time, a plant manager and his staff convinced us that a complete modernization of a large department was in order. The sum required was far beyond the department's accrued depreciation reserves, but the shop men talked the general management into giving them from company-wide depreciation funds the amount needed for the replace-



REQUEST FOR PURCHASE OF EQUIPMENT

STEWART-WARNER CORPORATION

Department for Which Purchase is Proposed 61 Date 9-27-46 No. 520

Total Cost $ 1,655.25 Replacement ☒ Additional ☐

Estimated Details:

Quantity	Description	Price	Amount

One (1) Blank Multiple-spindle Drilling & Tapping Machine Model 6 = complete description given in the accompanying circular. Machine includes twelve spindles (5/8-in. dia.) with arms and twelve collets, a hydro-pneumatic feed & 1-hp. motor, 220-volt, 3-phase, 60-cycle.
Price quoted is F.O.B., maker's plant ..... $ 1,530.00

Copy of quotation attached by machine-tool dealer - dated Aug. 14, 1946.

Delivery: Approx. 10 weeks after receipt of order.

Total $ 1,530.00
Electrical Labor - $30.00 Freight 19.65
Mat. - 20.00 Installation 75.00
Moving & Inst. - 25.00 Taxes 30.60
Grand Total $ 1,655.25

State Fully the Reason Why the Above Purchase is Proposed:

REASON: To increase Production and Decrease Manufacturing Costs.

John Jones proposes the installation of the above multiple-spindle drill equipped with hydro-pneumatic feed to supersede the present 3-spindle drill (special hand feed) which is over 20 years old.

John Jones states in his letter of Sept. 9, 1946, that on parts #78314 and 95577 (and similar parts enumerated on sheet #2) drilling two 11/64-and two 0.136-in. holes on the proposed machine should more than double the present rates. He proposes to work on 2 parts at the same time, utilizing 4 spindles and 4 fixtures. As the feed is automatic, the operator has both hands free to take care of loading and unloading of parts.

Compared with the present practice using the 3-spindle drill, in which the operator drills one 11/64-in. hole on one spindle and the 0.136-in. hole on another spindle (the spindle being hand-operated), thus slowing down the operations besides increasing operator fatigue.

If Replacement:
1. When was present equipment purchased? Year 1921 Cost $ 602.48 Salvage or Trade-in Value $ See below
2. Is present equipment worn out? No obsolete? For this particular purpose
3. Have repair costs been excessive? No (submit details on nature of repairs and approximate cost)

Present machine will be used for other jobs requiring a 3-spindle machine.

4. Is due to obsolescence, indicate whether
   a. Engineering change in product No
   b. Technological development of equipment Yes
5. State production present equipment 110 per hour, proposed equipment 220 per hour
   If equipment is to be used for the manufacture of more than one part attach schedule)
6. Indicate factory cost on present equipment $9.09 per M, proposed equipment $4.55 per M
7. Estimated annual production 384,800 units
8. Estimated annual savings $ 1,749.00

Purchasing Department

Factory Accounting Department

Issuing Department

IN THE EVENT OF REPLACEMENT SHOW BELOW EQUIPMENT TO BE SCRAPPED OR SOLD

Machine Number	Description	Weekly Average Operating Hours	Recorded Period From	To
* 660	3-Spindle Drill Press	-	-	-

If additional:
Is proposed equipment necessary because of
A. New Products?
B. Increased Production?
1. What is present production on existing facilities? ... per day (one eight hour shift)
2. What are requirements? ... per day
3. Has two or three shifts been considered? (Explain briefly)
C. Technological Development which supersedes present manual method? (If so execute the following schedule)

DETAILS OF ESTIMATED ANNUAL COSTS

	Present Method	Proposed Method	Savings or Loss
Direct Labor	$ 3,497.00	$ 1,748.00	$ 1,749.00
Material	-	-	-
Maintenance of Equipment	-	-	-
Expense Tools and Supplies	-	-	-
Indirect Labor (inspection, material handling, etc.)	-	-	-
Depreciation	-	-	-
Scrap	-	-	-
Other Items (specify)	-	-	-
Totals	$ 3,497.00	$ 1,748.00	$ 1,749.00
Total Estimated Annual Savings	$ 1,749.00		
Above savings calculated on annual volume of	384,800		

Other remarks:

See attached sheet for details on savings.

* Present machine will be used for other jobs requiring a 3-spindle machine.

Signed John Jones
Department Head

RECOMMENDED BY

Plant Engineer J. Smith Electrician F. Brown
Master Mechanic W. Black Safety Engineer A. Thomas
Superintendent R. Johnson Date 9-25-46

APPROVED

Plant Manager Ed. White Date 9-25-46 Authority Issued: No. 6424 Date 11-20-46

Request for Purchase of Equipment form, filled out in triplicate by the plant Committee on Equipment, includes full details. After review by interested operating executives, it goes to the plant manager for signature, then to the accounting department

ment portion of their plan. Their idea also included an increase in capacity, for which they obtained a new capital appropriation.

When they took delivery of the new machine tools and mechanical-handling equipment, they tore out most of their old machines, reset the relatively few units that they retained, and tied the operation into a compact whole with conveyors. The plant manager claims $60,000 saved in the first year, and the accounting department concedes $42,000. Whichever figure eventually becomes official, it is a nice rate of return on an investment that was made principally out of depreciation charges.

There's Canniness In It

Do not get the impression that we rush to spend exactly the amount of our depreciation funds each quarter regardless of conditions. For one thing, we buy more heavily when the machine-tool market looks good to us. Like any other thrifty manufacturer, we bought the bargain war-surplus machine tools that fitted our needs. One factor responsible for small variations is the resale market for our used equipment. The department gets a credit not only for its accrued depreciation, but also for any amount received for the old machine above its book value. If the actual sale price is below the book value, the deficit is deducted from the total available for replacements.

Also, when the plant has been working at a high rate, the machinery is wearing out faster than normal. So it requires a somewhat higher rate of replacement.

We Allow for Higher Prices

Another point: Today the depreciation is based, as always, upon a percentage of what the old machines cost. But the old machines were purchased during an era of prices lower than those prevailing today. If we were to hold doggedly to spending the same number of dollars as the total yielded by the standard depreciation percentage, our physical equipment in the plants would become of ever-increasing average age during these years.

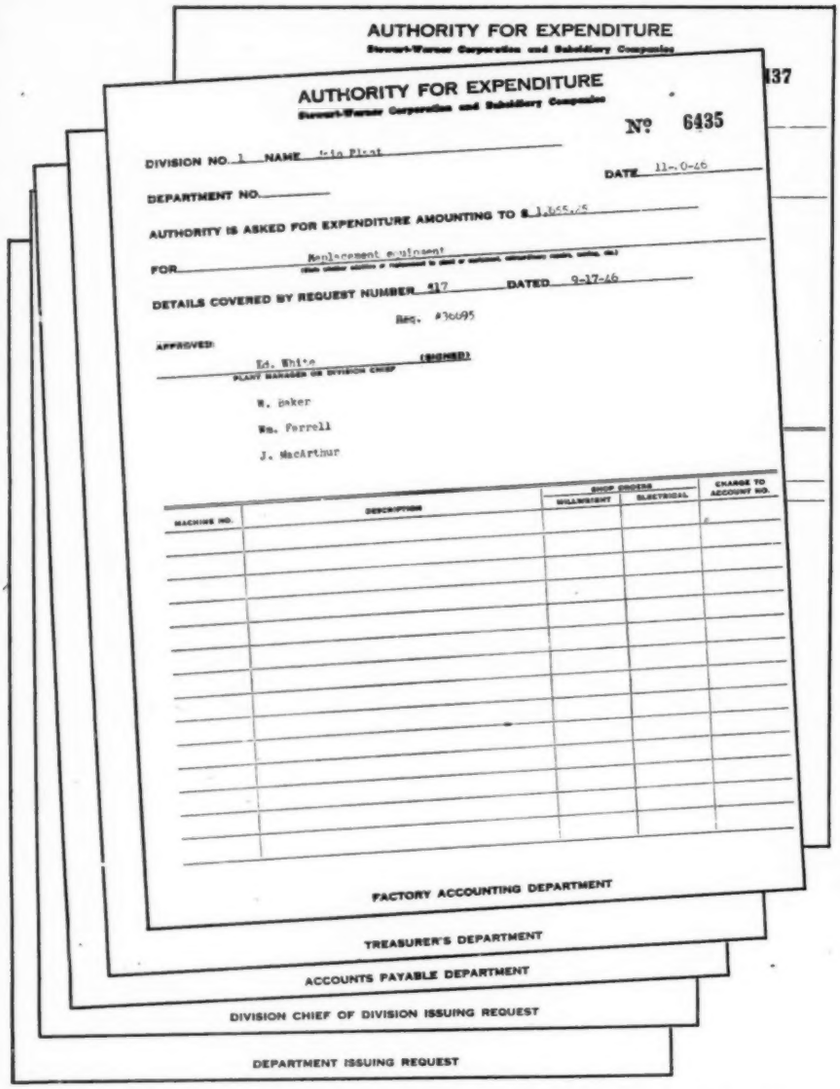
We accordingly try to keep our replacement policy flexible enough to meet any set of conditions. Over the long term, expenditures probably will average out very close to our theoretical normal—not only year by year but also plant by plant and department by department. Don't get the impression that all our equipment is new—much, as a matter of fact, is fully depreciated.

When the general management group has approved the "absolute must" list for any budget period, we then turn our attention to the "desirable" list. Here we work on a rule of thumb that we will purchase any new machine or equipment which will pay out within a reasonable period.

What Is a "Reasonable Period"?

The catch in this rule is how to define a reasonable period. If the equipment is intended to manufacture a product on which we must give the customer whatever design suits his momentary idea—for instance, a newly styled speedometer dial for a car—the new machine might well be required to "pay for itself" during its first year.

If the product seems likely to remain the same for the foreseeable future—Alemite fittings are an example—then the new equipment gets the nod even though its annual percentage of savings is forecast at a much more modest figure. In general-purpose equipment, we work to



Authority for Expenditure is filled out in six copies by the accounting department and forwarded for signatures required according to amount. The lower half varies, accounting copies including spaces for invoice, purchase order, account or shop order numbers, etc.

a rough formula of 2½ to 5 years for recovery of cost.

For purposes of asset accounting and allocation of depreciation charges to the approximately 10,000 items of our Machinery & Equipment account, we segregate this into three categories:

(1) **Standard Machine Tools,** readily identifiable, over which it is possible to exert a strict physical control. This group consists of 70% of our dollar value, but only 30% of the items.

(2) **Transient Equipment,** including hoists and other mechanical-handling devices, portable tools, and so forth. No matter how hard the management may try to keep everything under control, we know that these pieces of shop equipment will move around from department to department without official authorization or change in accounting record, and we accordingly have given up any effort to tie them down with red tape.

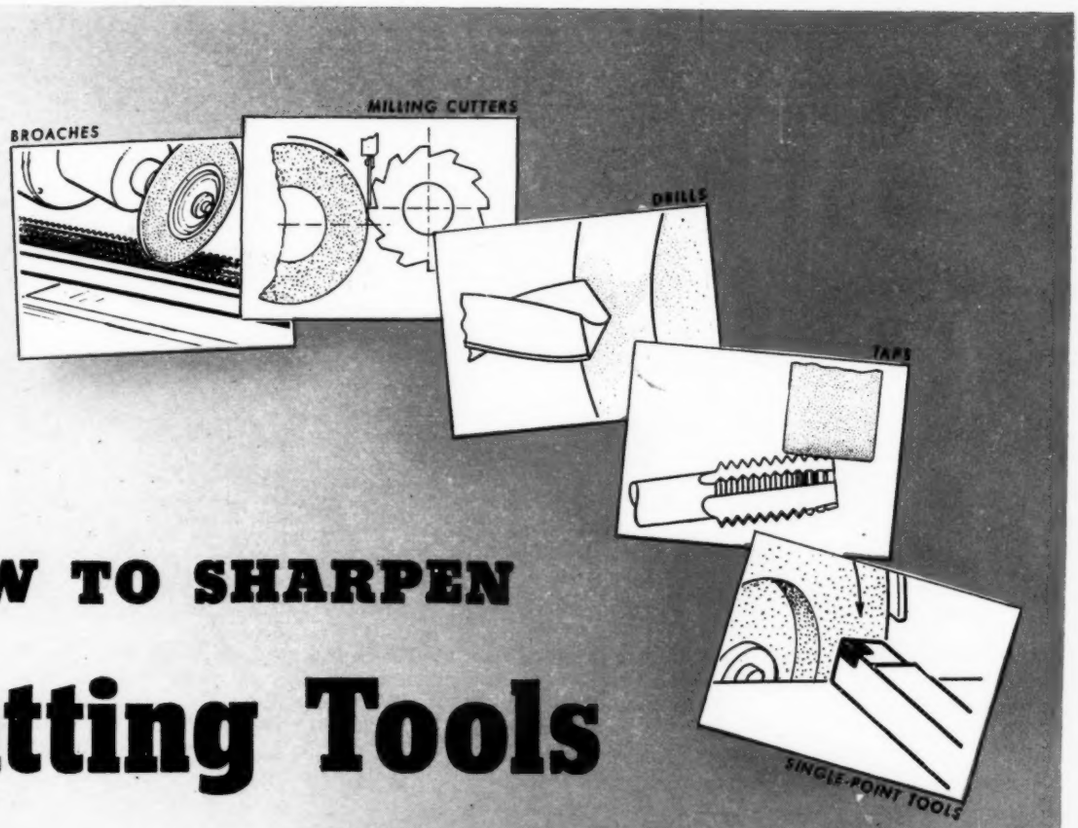
(3) **Electrical Equipment,** principally motors. These also are hard to find because they are shifted from one machine to another, frequently across department lines and occasionally between two adjoining plants according to production rather than accounting requirements.

Annually, toward the end of our fiscal year, each plant manager is expected to report his proposed expenditures for equipment. He usually relies upon a Committee on Equipment to originate and sift projects of this sort. Typical composition of this committee is the superintendent, the master mechanic, and the plant engineer or layout man. After they have gained the plant manager's general approval of an idea, the committee takes the first step in our formal procedure, filling out a triplicate formal Request for Purchase of Equipment. The request form requires full details of prospective output, costs, and so forth. It must also state whether it is for additional equipment or replacement. This then is reviewed through plant channels by such people as have a stake in the request, including the electrician and the safety engineer. With all recommendations in, it goes to the plant manager for his signature and forwarding of two copies to the accounting department.

Authority for Expenditure

Here originates the 6-copy Authority for Expenditure, to be forwarded through the successive levels required for its approval according to how much money is involved. Signatures which may be required, in ascending order as the amount rises, are plant manager or division chief, chief accounting officer, division vice president, and president. When and if approved, copies go to purchasing department, factory accounting department, treasurer's department, accounts payable department, division chief of division issuing request, and department issuing request.

To know at all times where authorized expenditures stand in relation to the depreciation funds available, the accounting department maintains a diary on the authorizations and commitments. A quarterly report goes from the accounting department to the plant manager on actual cost of purchases for his plant compared with authorized expenditures, and the extent to which he is overspent or underspent. He also gets an annual report on status of machinery and equipment going back several years for comparison. This report covers: (1) Equipment at Cost: Gross Additions, Retirements & Transfers, Net Value; (2) Depreciation Provision, Depreciation Reserve; (3) Book Value of Equipment Available; (4) Profit or Loss on Retirements; and (5) Unused Balance of Depreciation Fund. The form currently used takes this back to Jan. 1, 1940, by annual additions, and gives the current totals on Dec. 31, 1946, as well as the percent to equipment at cost of the depreciation reserve.



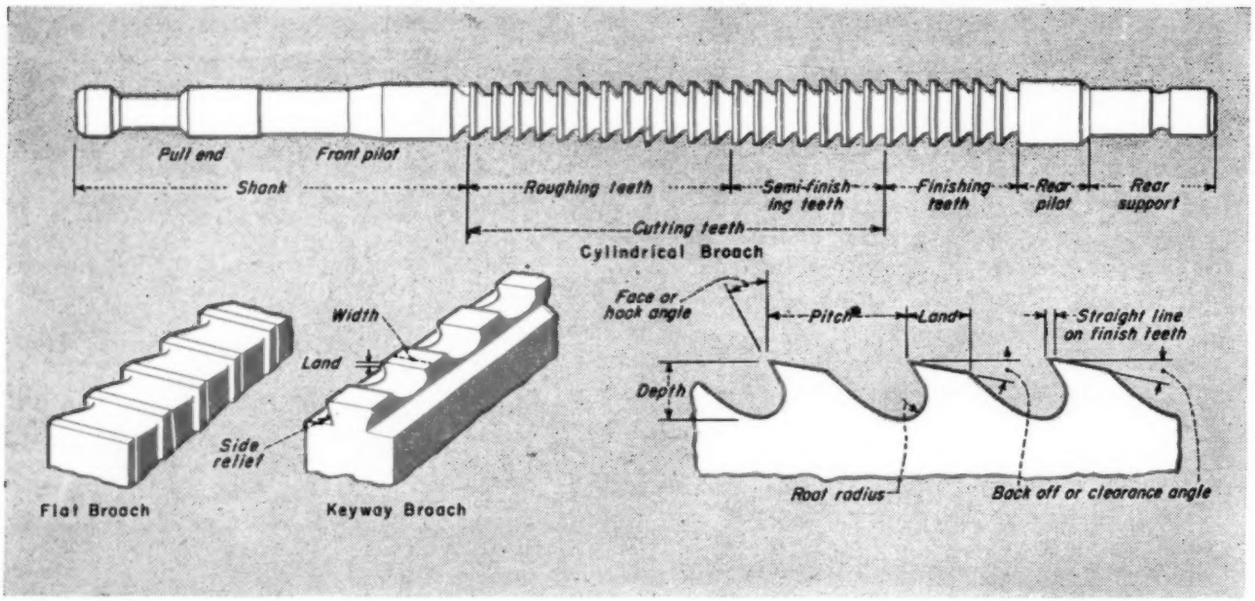
HOW TO SHARPEN
Cutting Tools

BY HARRY S. WHAREN, ASSOCIATE EDITOR

MACHINE TOOLS are only as good as their cutting tools. Cutting tools are no better than their sharpening. On tool sharpening rest performance, production, tool life, work finish and work quality. This report is presented to encourage their improvement by adoption and use of proper sharpening methods. To serve as a quick reference and guide—actually as a working manual—to tool engineer and to tool sharpener, the report has been prepared in sketch-caption form for maximum visualization. Machine operations are not described as that lies in the field of manufacturers' bulletins, nor is each operation on every type of tool shown because the great variety of tools precludes it. But basic types of tools are treated in such detail that special tools can be easily sharpened by applying the principles and fundamentals presented.

Proper sharpening in any shop must be closely allied with proper organization, if production is to be supplied with tools correctly ground. Because of the high cost of tools and the increased production cost that results from using poorly ground tools, progressive plants are more and more adopting central-toolroom sharpening where specialists are available to do a good job. But in adopting central-toolroom sharpening, management must also develop a system whereby tool grinders are supplied with adequate data for each job, whether standard or special.

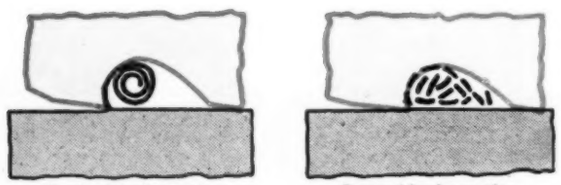
Just as no management would now permit a milling cutter to be ground offhand, all managements in the future should, for optimum machine-tool performance, provide adequate tool-grinding equipment and establish sharpening procedures, organization and training that will insure uniformity in production tools.



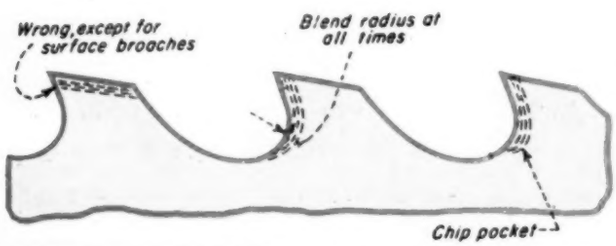
BROACHES may be classified according to operation as internal or external, to shape as cylindrical, flat or contour. The sharpening method depends on the type of broach, such as round, surface or keyway as here shown. Original tooth form must be maintained in sharpening to retain required chip clearance. Insufficient chip clearance causes chips to pack between teeth and break individual teeth or the whole broach, as broach teeth usually carry chips the length of cut. Chip breakers ground across the teeth prevent continuous chips

How to Sharpen

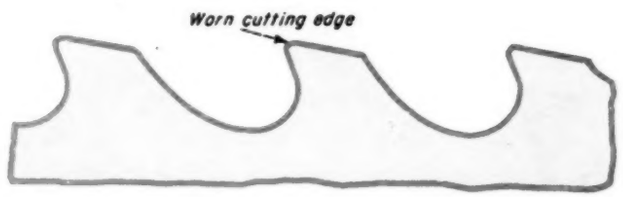
BROACHES



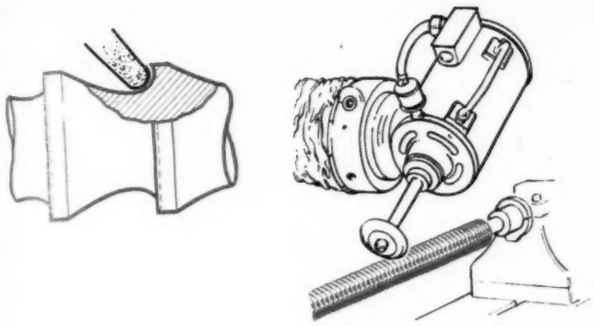
CHIP SPACE depends on the material broached. If a spiral chip, as from steel, curls into too small a space, added resistance dulls the broach, causes rough work surfaces, may break teeth and overload the machine. Changing chip space in sharpening destroys advantages of original tooth form

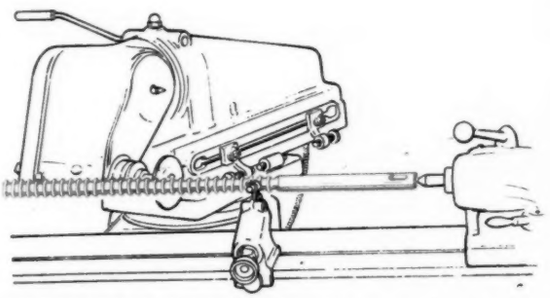


INTERNAL BROACHES are sharpened by grinding the front face only and blending the ground face into the chip-space contour. When the wheel produces a groove below the correct curvature, it forms a chip pocket that prevents chips from clearing the tooth point. A smooth finish permits chips to flow into a natural curl and increases broach life between grinds as cutting edges tend to stand up better than when rough. Surface broaches are sharpened by grinding not only the front face but also the top clearance when a straight land has been formed by tough or abrasive material. Restepping in grinding lands must be done carefully to maintain the same step per tooth and avoid overloading individual teeth and breaking them

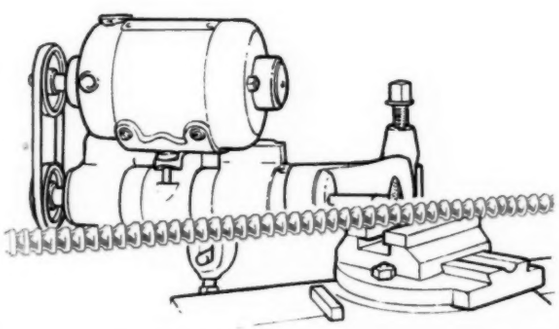


DULL BROACHES consume excessive power, are liable to damage and drift and cause increased wear. When cutting edges show turning, pickup or shiny worn lands, or when the work is under-sized or begins to show rough surface or tears, or when the pressure gages show increased power conumption, the broach needs sharpening. Permitting excessive wear shortens broach life as too much stock must be ground away to restore cutting edges. Examining teeth by a magnifying glass at regular intervals and frequent sharpenings prolong tool life





CYLINDRICAL BROACHES are sharpened between centers with the wheel set at an angle greater than the desired face angle to avoid wheel-edge interference. Otherwise its side generates a tooth face square with the axis, eliminating the face angle. An approximate working formula: wheelhead angle (to be changed as wheel wears) = face angle × wheel dia. ÷ broach root dia. Each tooth should be ground only enough to sharpen it. When taper is small and step per tooth must be held closely, grind all teeth by an amount sufficient to sharpen the dullest. Removing 0.010 to 0.015 in. should sharpen roughing teeth under normal conditions. All finishing teeth need not be ground each time. Common practice is to grind about 0.010 in. from the first one or two until they have worn undersize, when following teeth are sharpened the same way. When all finishing teeth are sharpened, stock removal may vary from 0.010 in. on first to 0.005 in. on last tooth. Undersize finishing teeth should be nicked to avoid wide chips. After each tooth face is ground, the wheel should "spark out," not be stopped quickly



CYLINDRICAL BROACHES can also be sharpened between centers in a lathe with a high-speed grinder mounted on the cross-slide. The same requirements as to maintenance of tooth form, avoidance of wheel-edge interference and stock removal must be met. Although lathe sharpening is satisfactory for any broach that is sharpened on centers, broach sharpening machines are faster and produce better work because of their rigidity

WATCH THESE POINTS IN BROACH SHARPENING

1. Maintain original tooth form because design characteristics affect operating efficiency.

2. Maintain original chip accommodation space to permit smooth chip flow.

3. Don't remove too much stock—just enough to sharpen tooth. Grinding away more than necessary on each tooth shortens broach life.

4. Do use blueprint as guide to face angle, clearance angle, tooth depth, radius and land width.

5. Remove galls and nicks on O.D. and also on spline sides before sharpening to increase broach life and prevent torn surfaces on broached work.

6. If you have no broach sharpener, mount a high-speed grinder on the cross-slide of a lathe for sharpening cylindrical broaches on centers. In broach sharpeners or lathes, bearings should be tight so there is no end play, as otherwise tooth faces will not be finished smoothly.

7. Don't throw away a broach with a broken tooth. Remove tooth and restep three or four following teeth to distribute load.

8. Backoff cylindrical-broach teeth only when absolutely necessary because of extremely poor condition. Use a broach sharpener or a good cylindrical grinder to increase clearance angle without changing tooth diameter at cutting edge.

9. Use a steady rest on a long broach to keep it in correct sharpening position and to prevent sag, vibration and chatter. Any spring changes the ground face angle.

10. Determine broach rpm. by cutting action of the wheel. Larger broaches are revolved slower than broaches of smaller diameter.

11. Measure tooth height carefully when grinding surface-broach lands and maintain original step per tooth.

12. Demagnetize the broach if held on a magnetic chuck during sharpening.

13. Be sure, when setting up broach inserts in a holder, that all contacting surfaces are clean and free from chips, that the teeth blend to give proper chip space where two sections meet, that inserts are not tightened too hard as they are liable to break and that dimensions at each insert are checked for height.

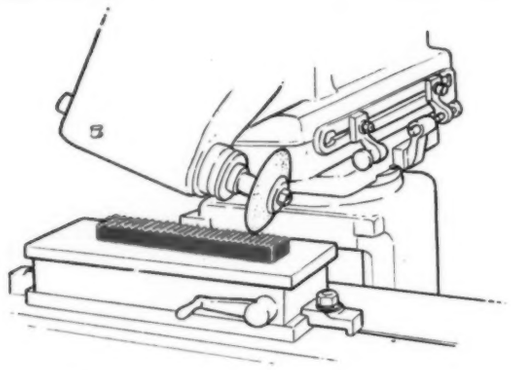
14. Grind dry or wet. In dry grinding, be careful to avoid burning the cutting edges and let the wheel "spark out."

15. Don't let broach teeth strike any metal surface, as teeth are extremely hard and easily damaged. Store them in wood or lined racks with individual compartments, and transport them in similar racks or in wooden bottom trucks with broaches separated by wood blocks.

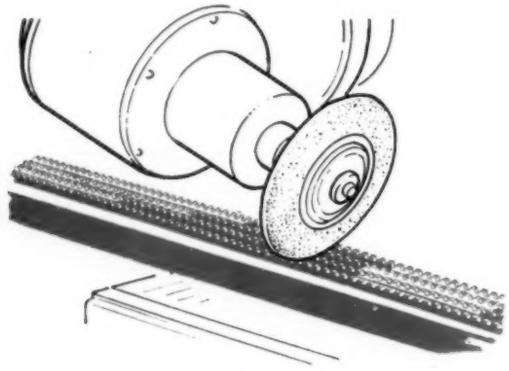
16. Don't pile broaches so they touch one another—never two in one rack compartment.

17. Use the right type of wheel—one in balance and not too hard. Hard wheels burn the work and overload the grinding spindle, causing it to spring away from the work. Recommended: face grinding—vitrified aluminum-oxide disk wheel of 46 to 80 grit with soft or medium bond, such as A-80-K-6-V, for roughing and 100 grit for finishing; backing-off—vitrified aluminum-oxide cup wheel of 60 grit with medium bond, such as A-60-L-5-V. For extremely smooth finish, use finer grain—up to 400.

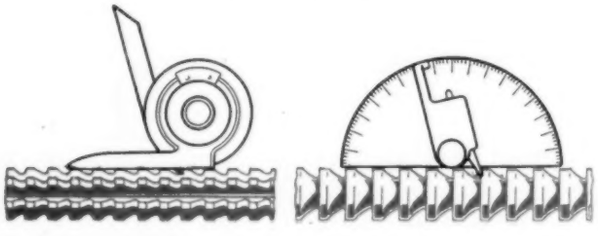
18. Stone cutting edges *lightly* to remove burrs and gain smoother surfaces, but don't remove enough material to form a negative land. ***Extreme care must be taken.*** Stoning teeth of long broaches also helps prevent tears in broached work.



SURFACE BROACHES, held on mechanical or magnetic chucks, are sharpened by grinding the face angle or the top clearance if either broach or work can be adjusted for depth of cut. When lands are backed-off, the step per tooth must be maintained and tooth depth increased to retain adequate chip space. In face grinding, the wheel spindle is tilted equal to the face angle and the wheel dressed to the correct radius with a slight concave surface so the only part in contact with the tooth face is the small portion just above the throat radius. As with cylindrical broaches, finishing teeth are sharpened as required. Sharpening shear-cut broaches with tooth angles of 5 to 20° is done by swinging the wheelhead to the shear angle and transversing the wheel across the tooth face as with straight-cut teeth



KEYWAY BROACHES are sharpened by grinding the front face on broach-sharpening machines or tool and cutter grinders. As the teeth have side relief, they should not be ground on top unless the straight part of the land is deep enough to allow a few top grindings without altering the tooth width. If a keyway broach is top ground, it must be shimmed for proper depth of cut. As with other broaches, tooth form must be maintained to retain chip clearance



FACE ANGLE of a new broach should be measured before use and retained in sharpening. Measurement can be made either by universal protractor or by a combination hook and radius gage. Furnished with radius gages from 1/32 to ¼ in., the combination gage determines face angle and proper curvature of chip space

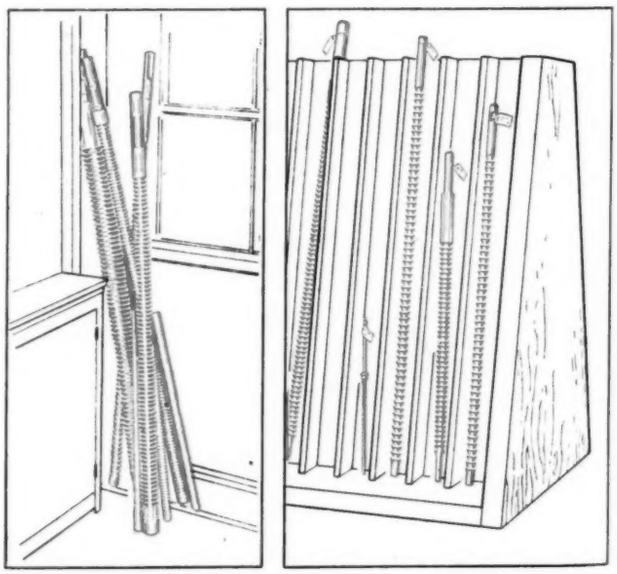
TABLE I — FACE AND CLEARANCE ANGLES

(Cylindrical and Surface Broaches)

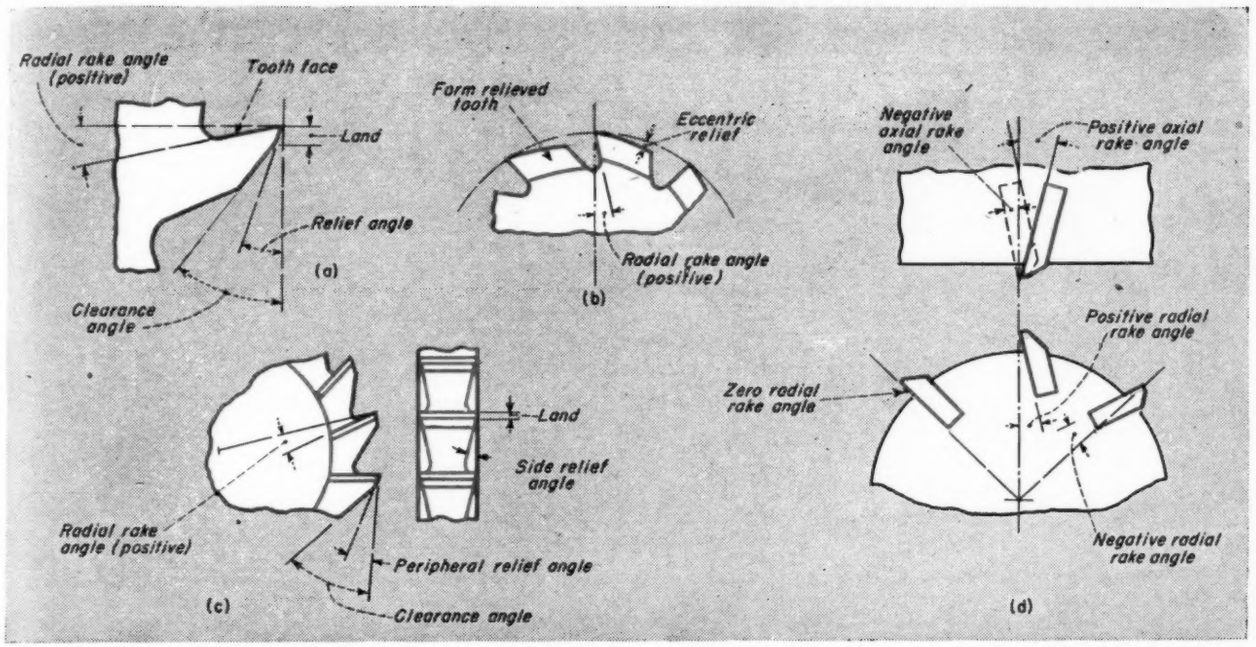
FACE, OR HOOK, ANGLE	
Material broached	*Deg.*
Cast iron	6 to 8
Hard steel	8 to 12
Soft steel	15 to 20
Aluminum	10, or more
Brass and bronze	0 to 10, or more
Brittle brass	—5 to +5
CLEARANCE ANGLE	
Cast iron	2 to 5
Steel	½ to 2*
Roughing teeth	1½
Finishing teeth	½ to 1**
Brass and bronze	
Roughing teeth	2
Semi-finishing teeth	1
Finishing teeth	½**
Spline broaches	
Roughing teeth	3
Finishing teeth	1½**
Surface broaches	Up to 3½

**Clearance angle may vary from 2° at the beginning end of broach to ½° at the finishing end. Holding clearance angle to a minimum reduces size loss when the broach is sharpened.*

***Part of the land of finishing teeth may be straight, and may be graduated from first to last finishing tooth. Size of land determines number of resharpenings possible before the broach is ground under size. Too much land increases cutting friction, causing expansion and galling of broached surfaces on some material.*



CORRECT HANDLING and storing lengthen broach life. Striking teeth on hard surfaces or against other broaches may break them. Recommended storage is in nearly vertical racks with individual wood or wood-lined compartments. Similar wheeled racks or wooden bottom trucks provide safe movement from shop to tool room. Handle heavy broaches by rope slings, never chain

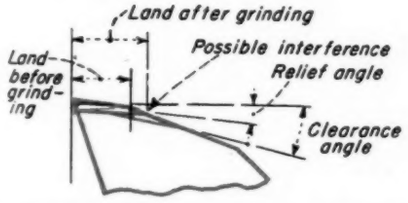


RAKE AND RELIEF ANGLES are the concern of the tool sharpener in restoring cutting edges. View (*a*) shows these angles on a tooth of a plain milling cutter, (*b*) on a form relieved cutter, (*c*) on a side milling cutter and (*d*) on a face milling cutter. Rake angle in (*a*), (*b*) and (*c*) is the deviation of tooth face from a radial line to the cutting edge, and may be positive (as shown), negative or zero, depending on tool material and the metal being milled. In face mills, teeth are inclined to both radial and axial lines, giving radial and axial rakes that may be positive, negative or zero. As rake angles determine production, finish, cutter life and power consumption and as relief angles prevent interference between tooth land and workpiece surface, they must, in sharpening, be maintained at specified values found to be most effective for the particular job

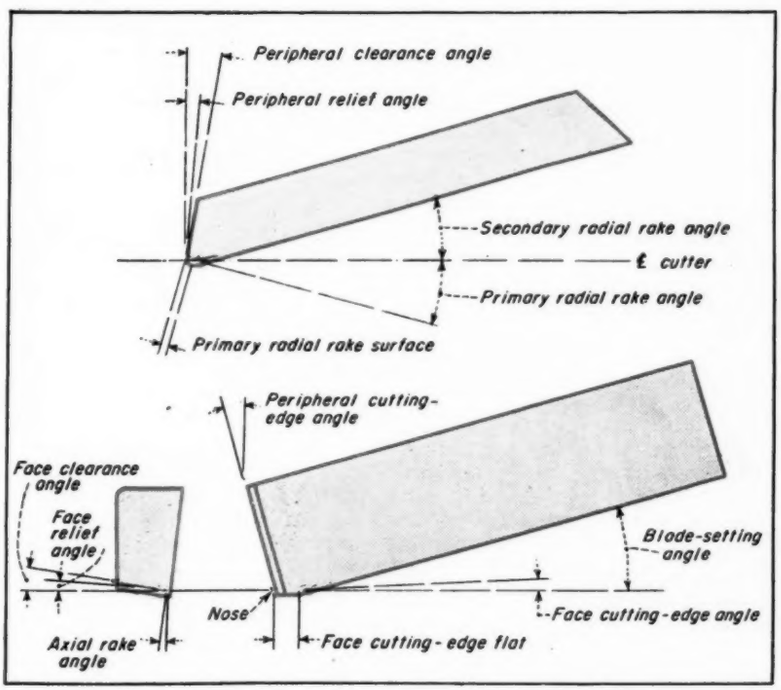
How to Sharpen

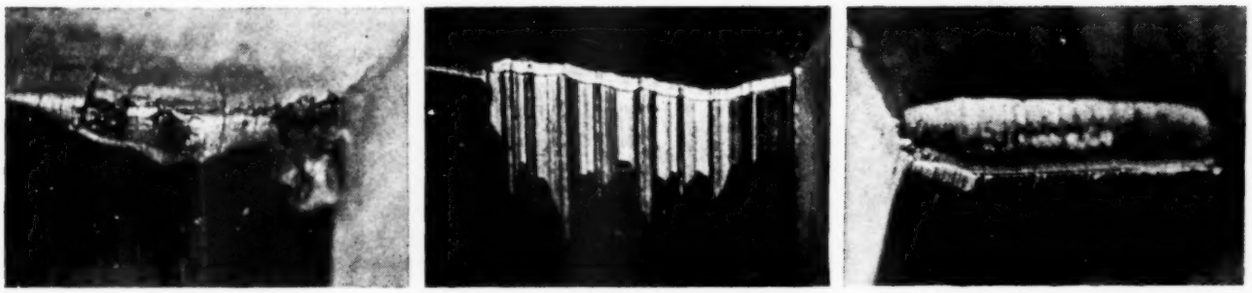
MILLING CUTTERS

FACE MILLING CUTTERS have, besides rake and relief angles, other elements of importance in sharpening. Nomenclature of this solid carbide blade is based on ASA standards. Instead of using both a relief and a clearance angle, some milling authorities prefer only one angle, usually of 7°. Relief and rake values recommended by one manufacturer for general purpose milling under normal operating conditions are listed in Table II and III



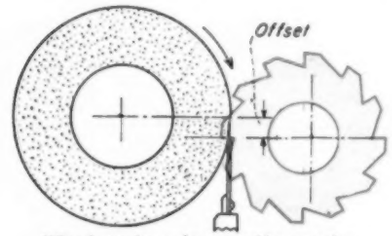
CLEARANCES on cutter teeth are usually provided when resharpening cutters. By increasing land width, repeated grinding may cause interference with the work surface. The clearance maintains land width and prevents this interference



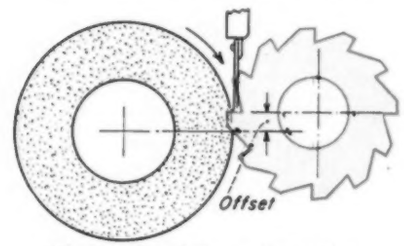


(a) (b) (c)

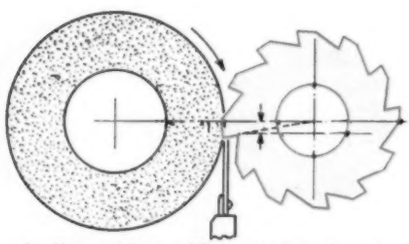
CUTTER RESHARPENING is needed when wear on the cutting edge has reduced required relief and about 0.010 to 0.035 in. of wear, based on operating conditions, is evident on the peripheral relief angle. Operating cutters beyond this point causes rubbing on the land, poor surface finish, decrease in cutter performance, possible splitting of keyway, arbor distortion and marked increase in material to be removed in sharpening. Abnormal wear, as shown, is characterized by chipping at the peripheral cutting edge in (*a*), excessive abrasion on peripheral or face relief angle in (*b*), excessive cratering in (*c*), and buildup on cutter teeth. These are caused by poor sharpening, incorrect relief and rake angles, faulty operating conditions or wrong grade of carbide. Except for abnormal wear, cutters should be reground frequently, preferably at specified intervals, so not more than 0.010 in. need be removed from high-speed-steel and cast-alloy blades and 0.006 in. from carbide blades



Wheel center above cutter center

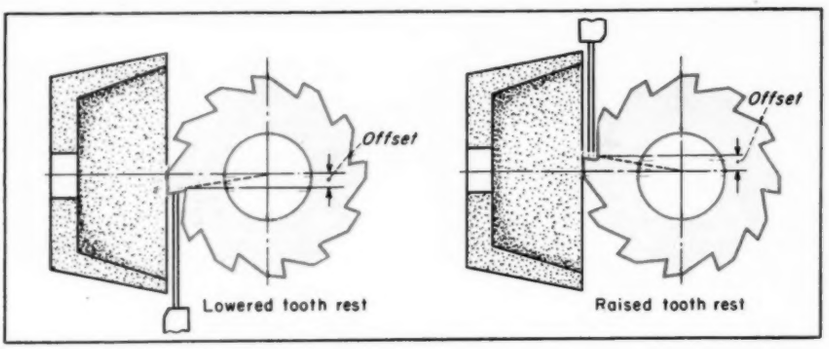


Wheel center below cutter center

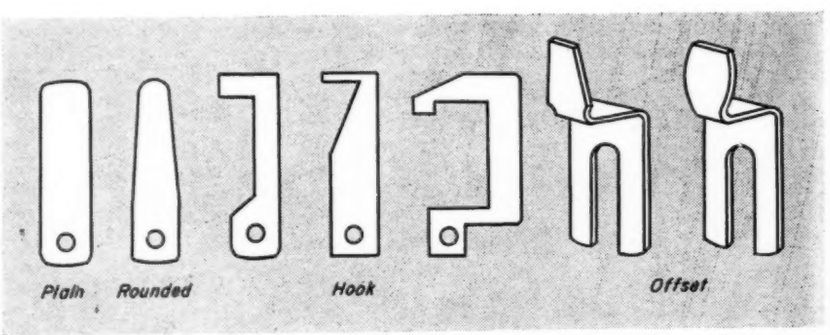


In-line centers with lowered tooth rest

RESTORING ORIGINAL RELIEF of peripheral cutters is done on tool and cutter grinders with either straight or cup wheels. Relief with a straight wheel is obtained by setting wheel center above or below cutter center, depending on direction of grinding (toward or away from the cutting edge) or by keeping wheel and cutter centers in line and lowering the tooth rest. For offset centers, the vertical distance equals 0.0088×wheel dia. × relief angle (Table IV) With in-line centers, vertical adjustment of tooth rest is 0.0088×wheel dia. × cutter dia. × relief angle (Table V).



RELIEF WITH A CUP WHEEL is obtained by raising or lowering the tooth rest so the cutter tooth is turned from the horizontal an amount equal to the relief angle. The vertical adjustment equals 0.0088 × cutter dia. × relief angle (Table IV). With either disk or cup wheel, direction of wheel rotation is optional. Grinding away from the cutting edge is safer but leaves a burr on the edge. Grinding toward the edge tends to lift the cutter from tooth rest so it must be held by hand, but if clearance is first rough-ground, grinding relief requires little pressure. As grinding toward the edge is less liable to overheat the cutting edge and allows faster grinding, experienced grinders prefer it



TOOTH RESTS, mounted on wheelhead or table depending on type of cutter (wheelhead for helical mills), hold cutter teeth in same relative position and angle to the wheel. Located on the face of the tooth being ground and close to the cutting edge (0.003 to 0.004 in.), the tooth rest may be plain, rounded, offset, hook or special. Offset rests are suitable for most cutters, rounded for helical mills, plain for straight-tooth mills and hook for small-diameter cutters with close tooth spacing. Holders are plain or universal, the latter having a micrometer adjustment for small vertical movements that are necessary in making close settings

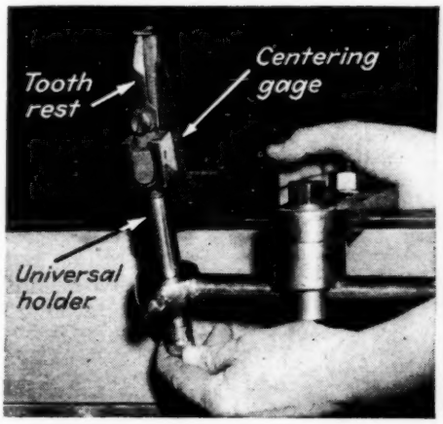
TABLE II
RELIEF ANGLES for MILLING CUTTERS

MATERIAL TO BE MILLED	ANGLE IN DEG.
Low-carbon steel	3-5
High-carbon and alloy steels	3
Cast iron	4-7
Soft brass and bronze	10-12
Medium and hard bronze	4-7
Aluminum alloys	10-12
Magnesium alloys	10-12

TABLE III
RAKE ANGLES for FACE MILLING CUTTERS

MATERIAL TO BE MILLED	HIGH-SPEED STEEL		CAST ALLOY		SINTERED CARBIDE	
	Radial Rake-deg.	Axial Rake-deg.	Radial Rake-deg.	Axial Rake-deg.	Radial Rake-deg.	Axial Rake-deg.
Soft cast iron	10-15	10-15	6-8	6-8	3-6	3-6
Mild steel	10-15	10-15	3-6	3-6	0-(-5)	0-(-5)
Hard cast iron	10	10	3-6	3-6	0-3	0-3
Hard alloy steel	10	10	0-3	0-3	0-(-10)	0-(-10)
Aluminum alloys	20-35	20-35	10-15	10-15	10-20	10-20
Magnesium alloys	20-35	20-35	15-25	15-25	15-25	15-25
Yellow brass and bronze	10	10	5	5	3	3

The Cincinnati Milling Machine Co:



SETTING TOOTH REST for proper relief is most easily done with a clearance setting gage. The tooth rest, either on wheelhead or table, depending on the cutter to be ground, is first centered with a centering gage placed on the table. The clearance setting gage, consisting of a zero-marked fixed plate, graduated dial and pinned dog, is set at zero when a cutter tooth is adjusted firmly on the rest. The rest is lowered to clear the tooth, the cutter rotated to desired relief angle on dial, the dial locked and the tooth rest again brought up against the tooth. The dog is then removed. When the rest is on the wheelhead, a cutter tooth may be centered by the centering gage and held in contact with the tooth rest as the wheelhead is lowered to give the required relief-angle reading on the dial. Use of centering and clearance setting gages is faster than calculating offsets

SHARPENING HELICAL TOOTH MILL

(Universal Tool and Cutter Grinder)

1. Swivel the wheelhead to 89° so the opposite side of the cup wheel clears the cutter.

2. Center the grinding wheel and cutter with a centering gage by adjusting the wheelhead until the gage plate lines up with the zero line on the wheelhead.

3. Mount offset tooth rest on wheelhead with the blade in front of the wheel edge.

4. Mount the cutter and clearance setting dog on the mandrel between tailstocks and center the first tooth to be ground by the centering gage placed on top of wheelhead.

5. Clamp the fixed plate of the clearance setting gage to the tail-stock, move cutter forward toward the wheel and tooth rest and adjust the tooth rest firmly against the cutter tooth and close to its cutting edge.

6. Unlock the gage dial and lower the wheelhead, with the tooth held in contact with the tooth-rest blade, to the desired relief angle on the dial. Lock the dial and remove the dog.

7. Bring the cutter into contact with the rotating wheel and traverse the table while holding the cutter in contact with the tooth rest by hand. Index for grinding the next tooth when the cutter is clear of the wheel face and bring it firmly against the tool rest. Repeat for all teeth with cuts not greater than 0.002 to 0.003 in.

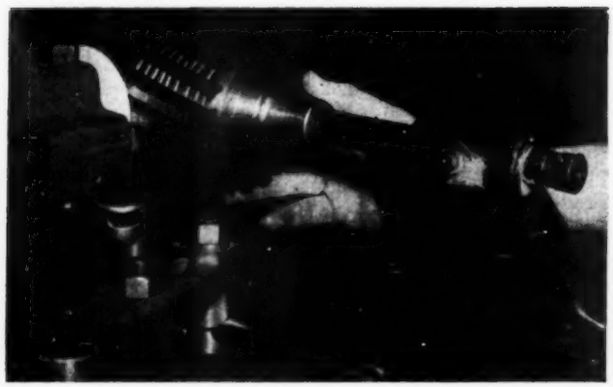
8. After grinding two or three teeth, revolve the cutter and grind two or three directly opposite; then measure diameters across ends of opposite ground teeth to check for parallelism. If out of parallel, swivel the machine table until teeth measure parallel.

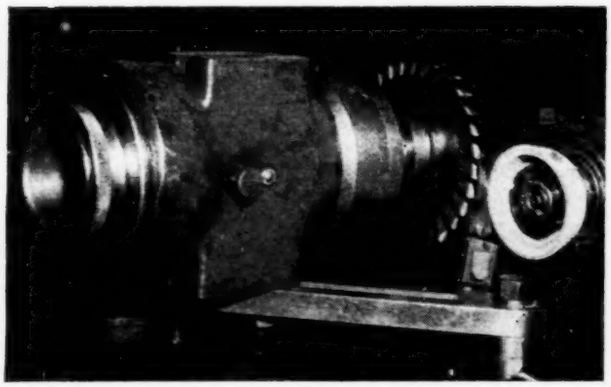
9. To compensate for wheel wear, grind all teeth, then revolve cutter 180°, feed in and repeat grinding on all teeth until cutter is sharp.

10. Grind the clearance in the same way with a greater dial reading, or first rough-grind clearance before grinding relief.

11. After each resharpening, check relief angles as variations reduce cutter life. Each tooth can be checked by a dial indicator measuring the fall across the land. Each degree of relief equals approximately 0.001-in. fall on a 1/16-in. land and 0.002 in. on a 1/8-in. land.

12. To avoid checking each tooth, cylindrical grind near the cutting edge a small circular land, not over 1/64 in. on the tooth flank. Then grind the relief, as outlined above, until the land has nearly disappeared. When only about 0.002 to 0.003-in. width of circular land is left at the cutting edge, the cutter is sharpened.





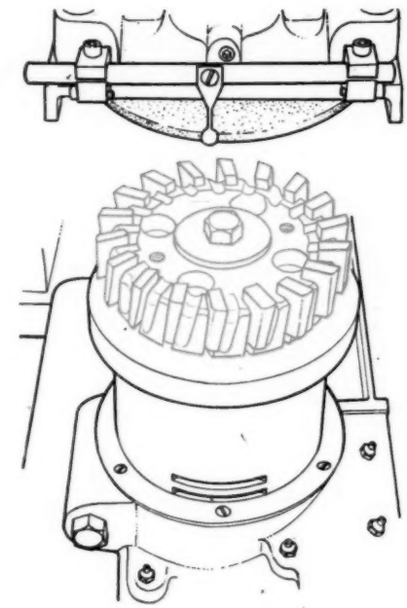
PERIPHERAL MILLING CUTTERS (whether plain, helical, angular, side, staggered-tooth, saws, face or end mills) are sharpened by grinding necessary relief and differ only in setup required. For the helical-tooth mill in this setup (see accompanying box) the wheel is dressed with a diamond dresser so it cuts only on the outside edge as the cutter is traversed past the wheel by hand feeding the table endwise. When the table is moved to the left for the finishing cut, cutter helix keeps the tooth firmly in contact with the tooth rest

SIDE MILLING CUTTERS are sharpened by grinding peripheral relief as on a helical mill and then mounting in an attachment for grinding the side-tooth relief. The wheelhead is swung ½° at its base to clear the opposite wheel edge and tilted down for side relief. The tooth rest supports each tooth at center, while all teeth are ground first on one side and then, with the cutter reversed, on the other side. Staggered-tooth cutters are likewise sharpened on the periphery but not on the sides, because side grinding would alter width

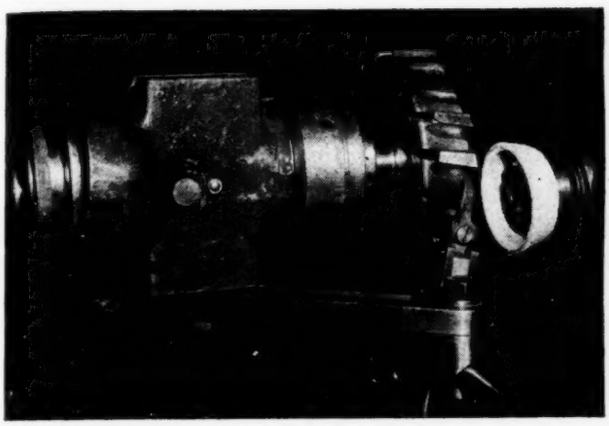
TABLE IV — CUTTER RELIEF SETTINGS *(Straight or Cup Wheel)*

Wheel* OR CUTTER** DIA.	RELIEF ANGLE IN DEG. 1°	2°	3°	4°	5°	6°	7°	8°	9°	10°
3	0.026	0.052	0.078	0.104	0.130	0.156	0.182	0.208	0.235	0.261
3¼	0.028	0.056	0.084	0.113	0.141	0.169	0.198	0.226	0.254	0.283
3½	0.030	0.061	0.091	0.122	0.152	0.182	0.213	0.243	0.274	0.304
3¾	0.032	0.065	0.097	0.131	0.163	0.195	0.228	0.261	0.293	0.326
4	0.034	0.069	0.104	0.139	0.174	0.208	0.243	0.278	0.313	0.348
4¼	0.037	0.074	0.111	0.148	0.185	0.222	0.258	0.295	0.333	0.370
4½	0.039	0.078	0.117	0.156	0.196	0.235	0.273	0.312	0.352	0.391
4¾	0.041	0.082	0.124	0.165	0.206	0.248	0.288	0.330	0.372	0.413
5	0.043	0.087	0.130	0.174	0.217	0.261	0.304	0.347	0.391	0.435
5¼	0.045	0.091	0.137	0.183	0.228	0.274	0.319	0.365	0.411	0.457
5½	0.047	0.095	0.144	0.191	0.239	0.287	0.335	0.382	0.430	0.478
5¾	0.050	0.100	0.150	0.200	0.250	0.300	0.350	0.400	0.450	0.500
6	0.052	0.104	0.156	0.208	0.261	0.313	0.365	0.417	0.470	0.521
6¼	0.054	0.109	0.163	0.217	0.272	0.326	0.380	0.435	0.489	0.543
6½	0.056	0.113	0.169	0.226	0.283	0.339	0.395	0.452	0.509	0.565
6¾	0.058	0.117	0.176	0.235	0.294	0.352	0.410	0.470	0.529	0.587
7	0.061	0.122	0.182	0.243	0.304	0.365	0.425	0.487	0.549	0.609
7¼	0.063	0.126	0.189	0.252	0.315	0.378	0.440	0.504	0.568	0.630
7½	0.065	0.130	0.195	0.261	0.326	0.391	0.456	0.522	0.588	0.651
7¾	0.067	0.135	0.202	0.270	0.337	0.404	0.471	0.540	0.607	0.673
8	0.069	0.139	0.208	0.278	0.347	0.417	0.487	0.557	0.626	0.695
8½	0.074	0.148	0.222	0.296	0.370	0.444	0.518	0.592	0.666	0.740
9	0.078	0.157	0.235	0.313	0.391	0.470	0.548	0.626	0.705	0.783
9½	0.083	0.165	0.248	0.331	0.413	0.496	0.579	0.664	0.747	0.827
10	0.087	0.174	0.261	0.348	0.435	0.522	0.609	0.696	0.783	0.870
10½	0.091	0.183	0.274	0.365	0.455	0.547	0.639	0.730	0.822	0.914
11	0.096	0.191	0.287	0.383	0.479	0.574	0.670	0.766	0.861	0.957
11½	0.100	0.200	0.300	0.400	0.500	0.600	0.700	0.800	0.900	1.000
12	0.104	0.209	0.313	0.418	0.522	0.626	0.731	0.835	0.940	1.044
12½	0.108	0.218	0.326	0.435	0.544	0.653	0.761	0.870	0.979	1.088
13	0.113	0.226	0.339	0.452	0.565	0.679	0.792	0.905	1.018	1.131
14	0.122	0.244	0.366	0.487	0.609	0.731	0.853	0.974	1.096	1.218
15	0.131	0.261	0.392	0.522	0.653	0.783	0.914	1.044	1.175	1.305
16	0.139	0.278	0.418	0.557	0.696	0.835	0.974	1.114	1.253	1.392

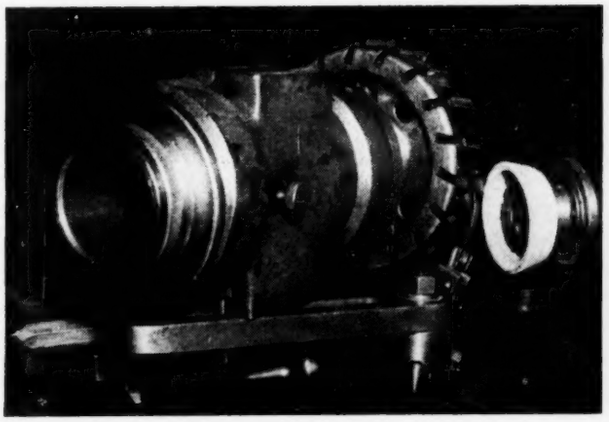
**Wheel diameter applies for selecting distance to set wheel center above or below cutter center when using a straight wheel.*
***Cutter diameter applies for selecting distance to set tooth rest above or below cutter center when using a cup wheel*



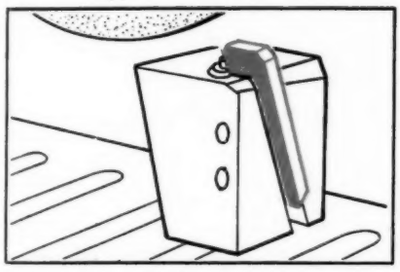
FACE MILLING CUTTERS are of two types: (1) those with solid or brazed-teeth or inserted blades ground on cutter grinders and (2) those with removable blades ground in a fixture or offhand. Cutter-grinder sharpening consists in grinding peripheral relief and clearance, face relief and clearance along the face-cutting edge angle and chamfering the corners (see accompanying box). Here shown is a setup for grinding peripheral relief on a cutter grinder having a straight wheel and the cutter mounted on a vertical spindle. All teeth are ground in succession while the cutter is held firmly against the tooth rest

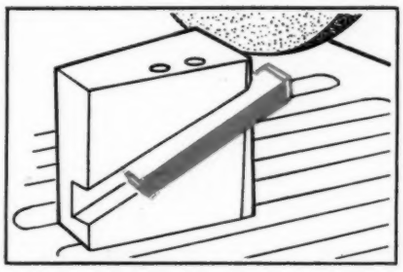


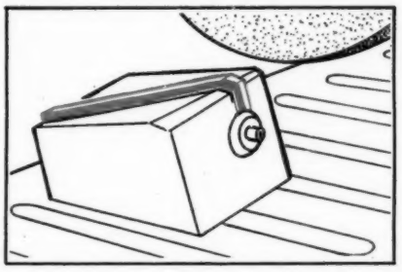
SHARPENING of face mills on a universal tool and cutter grinder is done with a cup wheel. The cutter is mounted between centers or in a workhead for grinding wheel relief and in a workhead for grinding face relief and chamfer. Set up here to grind face relief, the grinder carries the tooth rest on the attachment. Hand traverse of tooth past wheel sharpens the cutter



CHAMFERING CORNERS is done by swinging the grinding-machine table or workhead to 45° or whatever the corner angle may be, tilting the workhead to required face relief angle, adjusting the tooth rest under tooth to be ground to proper height for peripheral relief and grinding in order already given; that is, all teeth are ground in succession while held against rest







REMOVABLE CARBIDE BLADES for face mills can be ground offhand with the aid of a protractor attachment on a single-point tool grinder, using a 60-grit silicon-carbide or a 100-grit diamond wheel for roughing and a 320-grit diamond wheel for finishing, or on a surface grinder with a multi-face fixture. The latter here shown incorporates the necessary angles for grinding proper reliefs (see accompanying box). Fixtures vary according to material to be milled; one is for blades for milling steel and alloy cast iron, another for gray iron, brass and bronze, and a third for soft steel or light alloys as the relief angle varies according to the material

SHARPENING FACE MILL

1. Starting with a new set of blades, cylindrical grind the periphery, face grind the side teeth and circle grind the chamfer. Or rough-grind loose blades on a single-point tool grinder.

2. Grind peripheral relief on O.D. with the tooth rest set on the tooth being ground until the circular land from cylinderical grinding is reduced to a narrow width (0.002 to 0.003 in.) On carbide tips, take light cuts, not over 0.0003 to 0.0005 in. with a diamond flaring cup wheel. Heavier cuts may cause localized overheating and possible checking and cracking of the carbide. Grind all teeth after each wheel infeed to allow the tip to cool between passes.

3. Grind peripheral clearance of 3 to 5° greater than the relief up to a and 1/32 to 3/64 in. wide.

4. Grind face relief along face cutting-edge angle. If the dish angle is more than 1°, no secondary clearance is needed. When blades are set in the cutter body with a positive radial rake, eliminate effect of this angle by setting the blade to be ground horizontal with a centering gage and scale.

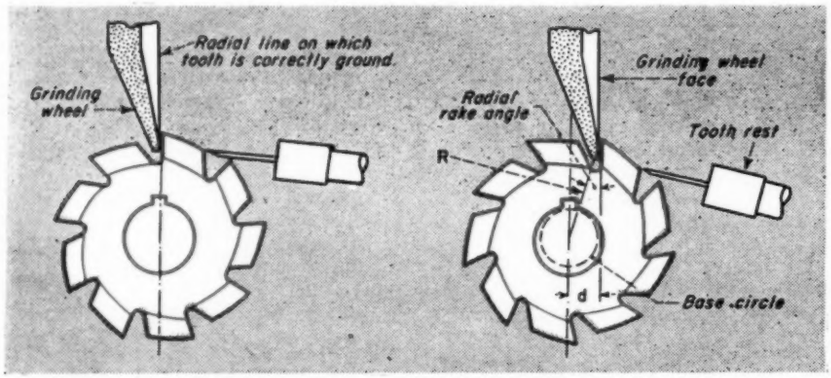
5. Grind the chamfer clearance or primary radial rake angle.

6. Alternative method is first to grind peripheral clearance, face clearance and chamfer and then to grind peripheral and face reliefs.

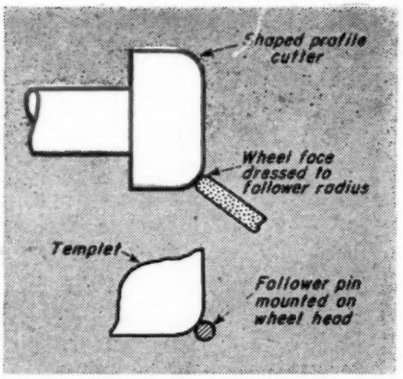
7. If a carbide tip is brazed on the cutter body, snag off the steel at the heel of blade on cutter face with a silicon-carbide wheel, either before or after sharpening.

8. Whatever sharpening sequence is followed, honing the cutting edges improves cutter performance and life in steel cutting. Hone lightly (0.003 in. land) with a 320-grit silicon-carbide or 400-grit diamond hone at 45° to the cutting edge. Also hone intersections of chamfer with periphery and face to about a 0.010-in. radius.

9. After each resharpening, check the cutter by dial indicator for relief and run-out on periphery, face and corner. Most common errors are: (1) blade faces not at right angles to cutter axis, resulting in possible scratching at toe or heel; (2) high blades that would do all the cutting; and (3) high points on blades which would cause scratches on the work.



FORM-RELIEVED CUTTERS are face-sharpened only. Zero-rake cutters are sharpened radially by centering the wheel face over the cutter center and adjusting the tooth rest against the back of the tooth to be ground. Positive-rake cutters are offset from the wheel face by an amount (usually marked in thousandths of an inch on the cutter) to provide required rake. If the rake is in degrees, offset d (in in.) $= R \sin r$. Grinding is done by passing the cutter under the wheel and indexing after each pass. To insure uniform tooth height, each tooth should be first spot-ground on the back for the tooth rest. Sharpening as soon as cutting edges shows signs of wear lengthens cutter life. After grinding, rake and helix angles should be checked as any change in them affects cutter and work contour and cannot be tolerated on closely held work



SHAPED PROFILE CUTTERS are sharpened the same as peripheral milling cutters, rather than sharpened on tooth faces as with form relieved cutters. As a complicated outline may be hard to follow, a templet made to the tooth contour and a follower pin mounted on the wheelhead permit duplicating in the cutter the path of the pin as it follows the templet contour. Relief is ground by raising wheel center

TABLE V — CUTTER RELIEF SETTINGS

(Straight Wheel, In-line Center, Tooth Rest Lowered)

CUTTER DIA.	GRINDING-WHEEL DIA. = 3 IN. RELIEF ANGLE IN DEG.									
	1	2	3	4	5	6	7	8	9	10
2	0.010	0.020	0.030	0.040	0.050	0.060	0.070	0.080	0.090	0.100
3	0.013	0.026	0.039	0.052	0.065	0.078	0.091	0.104	0.117	0.131
4	0.014	0.028	0.041	0.055	0.069	0.081	0.097	0.110	0.124	0.138
5	0.016	0.032	0.049	0.065	0.081	0.097	0.113	0.130	0.146	0.162
6	0.017	0.035	0.052	0.070	0.087	0.104	0.121	0.139	0.157	0.174
7	0.018	0.036	0.055	0.073	0.091	0.109	0.127	0.146	0.164	0.182
8	0.019	0.038	0.057	0.076	0.095	0.113	0.132	0.151	0.170	0.189
9	.0196	0.039	0.059	0.078	0.098	0.118	0.137	0.157	0.176	0.196
10	0.020	0.040	0.060	0.080	0.100	0.120	0.140	0.160	0.180	0.200

	GRINDING-WHEEL DIA. = 6 IN. RELIEF ANGLE IN DEG.									
	1	2	3	4	5	6	7	8	9	10
2	0.013	0.026	0.039	0.052	0.065	0.078	0.091	0.104	0.117	0.131
3	0.017	0.035	0.052	0.070	0.087	0.104	0.121	0.139	0.157	0.174
4	0.021	0.042	0.062	0.083	0.104	0.125	0.146	0.166	0.187	0.208
5	0.023	0.047	0.070	0.094	0.117	0.140	0.164	0.187	0.211	0.234
6	0.026	0.052	0.078	0.104	0.131	0.157	0.183	0.209	0.235	0.261
7	0.028	0.056	0.084	0.112	0.141	0.169	0.197	0.225	0.253	0.281
8	0.029	0.060	0.089	0.119	0.149	0.179	0.209	0.238	0.268	0.298
9	0.031	0.063	0.094	0.125	0.157	0.188	0.219	0.250	0.282	0.313
10	0.033	0.065	0.097	0.130	0.163	0.196	0.228	0.261	0.293	0.326

TABLE VI — ALLOWABLE MILLING CUTTER RUN-OUT

CUTTER DIA. IN.	ROUGHING		FINISHING	
	FACE	PERIPHERY AND CHAMFER	FACE	PERIPHERY AND CHAMFER
Up to 12	0.001	0.002	0.0005	0.0015
12 to 16	0.0015	0.003	0.00075	0.002
Over 16	0.002	0.004	0.001	0.0025

SHARPENING FACE-MILL BLADES IN FIXTURE

1. If the blade is chipped or cracked, rough-grind it offhand on a table grinder with the table set at 25°.

2. Clamp the blade in the slot with about ½-in. overhang. With the fixture resting on face 1, grind the peripheral relief land. The fixture angle is 22° but, combined with body setting, it results in a peripheral relief of 7°.

3. With the fixture resting on face 2, grind the radial rake land (K-land) that forms the radial rake. Width of this land should be at least 1½ × chip thickness. With a chip load of 0.016 in., K-land width should be 0.024 in. For usual work, make the K-land 0.030 to 0.035 in.

4. Position the blade against the stop pin, set on face 3 and grind the face relief land, which forms the face cutting-edge angle and face relief angle when the blade is set in the body.

5. In grinding the face-relief land, make the last pass with the wheelhead or table in exactly the same vertical position and use the cross-feed so the finishing face of all blades will be the same height and therefore in the same plane when inserted into the cutter body.

6. In making all passes, use a light feed of 0.0003 to 0.0005 in. per pass and a rapid table travel of 40 to 60 passes per min.

7. Hone cutting edges lightly.

8. Reset blades in cutter body by means of a fixture or by taking a fly cut with one blade and setting the other blades to the shoulder of the fly cut.

DO'S AND DONT'S IN CUTTER SHARPENING

1. Use the right wheel. For high-speed-steel or cast-alloy cutters, soft-bonded wheels provide free cutting action with little danger of overheating and checking the cutting edges.

2. For peripheral-type cutters, sharpened by grinding the relief lands, use cup or straight aluminum-oxide wheels A-46-J or K-5-V or A-60-J-5-V. For formed cutters, sharpened by grinding on the face, use dish wheels A-46-J-5-V or A-60-I-8-V.

3. Sharpen high-speed-steel and cast-alloy cutters *dry*, as water cools the cutting edges too quickly and causes cracking. Dry grinding also permits operator to see the operation better.

4. Use a light grinding pressure for steel and cast-alloy cutters, and take light cuts—0.002 to 0.003 in. in roughing and not over 0.0005 in. in finishing. Light cuts with fairly rapid traverse prevent overheating more so than do heavy cuts with slow traverse. Narrow cutters may require even lighter cuts—0.0005 to 0.0015 in. in roughing to prevent drawing tooth temper.

5. For grinding the carbide only on carbide-tipped cutters, use diamond wheels. Silicon-carbide wheels are used sometimes for cylindrical grinding of new teeth, but diamond wheels are recommended, even for this roughing operation as they cut faster, generate limited heat and wear much slower. Slow wear means that diamond wheels hold size better and sharpen all teeth to the same height.

6. Following diamond wheels (vitrified, particularly) are suggested for specific operations: 100 grit straight for cylindrical or circle grinding, where more than 0.002 in. of stock is to be removed, 150 to 220 grit for finishing and 320 to 500 grit for fine finishing to a mirror finish A resinoid 100-grit cup wheel will give a fine finish at a slow feed—6 ipm.

7. Take light cuts with diamond wheels—no more than 0.0005 in. in roughing and 0.0001 to 0.0003 in. in finishing, letting the finish cut spark out for best finish. For vitrified wheels, traverse the table fairly fast, about 50 ipm., in roughing and about half that fast in finishing, and operate wheels at about 6,000 sfpm. Use slower feeds for resinoid- or metallic-bonded wheels.

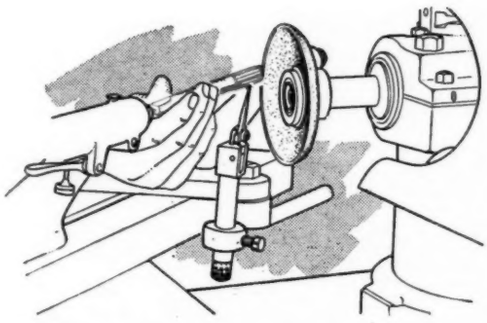
8. For carbide cutters, run the diamond wheel off or onto the cutting edge as convenient, because recent tests show no appreciable difference in surface finish. Grinding toward the cutting edge may reduce the tendency to chip out.

9. Grind carbide cutters *wet* as dry grinding loads the wheel. Apply in a stream or with a wick. Satisfactory coolants or solvents are kerosene, a mixture of soluble oil and water (80 to 1), plain water with a rust inhibitor or the commercial solvents marketed for this application. Clean diamond wheels with lump pumice or silicon-carbide sticks.

10. Before sharpening, examine carbide tips with about a 14 × magnifying glass or microscope for cracks in the crater and on the flank. As all the damaged part of the tip must be removed in sharpening, cracks that are too long to remove by grinding may require replacement of the tip.

11. After sharpening, hone cutting edges of all cutters for milling steel. Stoning the edges reduces roughness of grinding marks and friction in use, and increase tool life. For high-speed-steel or cast-alloy cutters, use an aluminum-oxide or hard Arkansas oil stone of 100 to 200 grit. A few passes with a light, even pressure produce a fine finish.

12. For carbide tips, use a 320-grit silicon-carbide or a 400-grit diamond hone held at 45° to the cutting edge and leave a land about 0.003 in. wide.



REAMER SHARPENING follows closely the recommended practices for milling cutters. Solid chucking reamers are ground on the chamfer, usually to 45° and preferably before they show excessive wear. Relief varies from 7 to 12° for normal conditions and from 5 to 8° on carbide reamers. Expansion reamers are set over-size and backed off as with a milling cutter, leaving a land of proper width for the material to be reamed. Wheels suggested—A-46-K-5-V for high-speed-steel reamers and 220- to 300-grit diamond for carbide reamers

FINE FINISH GRINDING

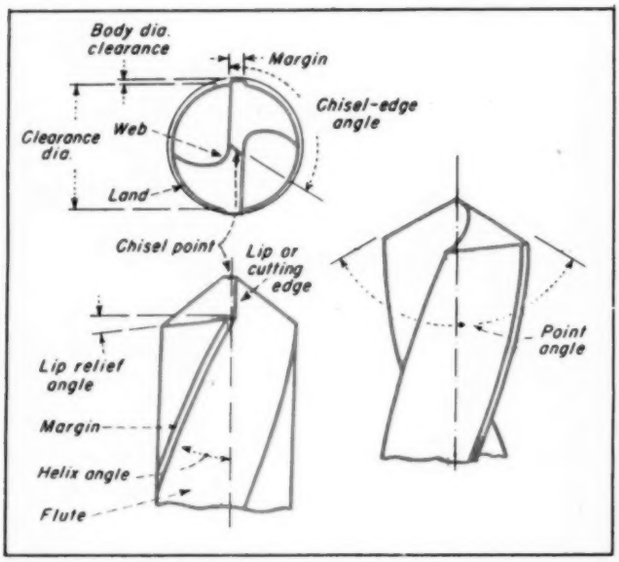
1. When high-speed-steel cutters are sharpened with grinding wheels that leave the cutting edges rough, the high spots break off in operation and edges dull rapidly. But a smooth finish increases life between grinds, gives better quality of work, reduces setup time, lowers cost because of fewer sharpenings and lessens power consumption.

2. The usual method of obtaining a good finish is to finish-grind with a 60-grit wheel and make a slow traverse with no feed in the last two passes, that is, to spark out, followed by hand honing.

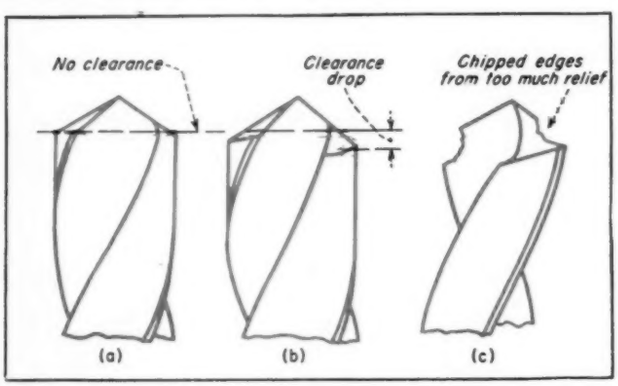
3. The second method is to leave from 0.0005 to 0.001 in. of stock for extra-fine finishing by a 320-grit shellac- or resinoid-bonded, silicon-carbide wheel, such as a C-320-J-8-E. This method with the cutter grinder in good condition can produce a cutting-edge finish of 1.0 to 1.5 microinch. One precaution must be observed: removing more than 0.001 in. of stock may overheat and burn the edge. A light pass of 0.0005 in. is preferable.

How to Sharpen

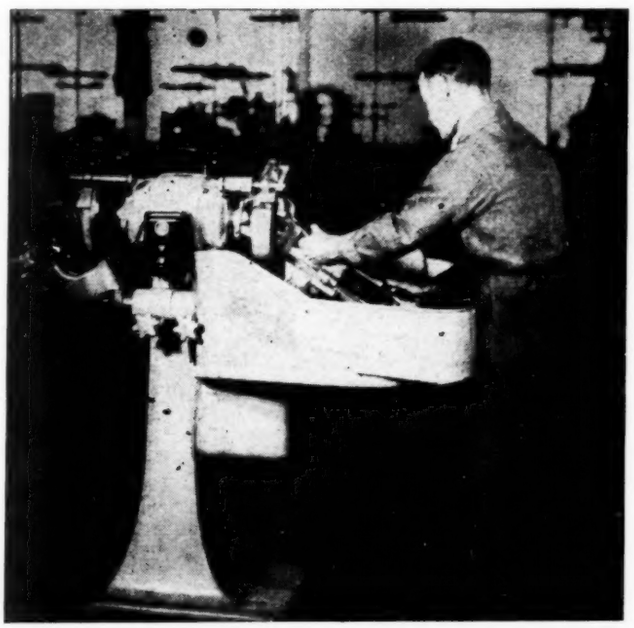
DRILLS



DRILL TERMINOLOGY, as adopted by ASA, designates the cone-shaped cutting end as the point. Two parallel, equal-length lips (in a 2-flute drill) connected by the chisel edge form the cutting edges. The heel, or end surface back of the cutting edges, is ground to give lip relief, or clearance, that increases from periphery toward the center, but is measured at the periphery. Point angle is the angle included between the lips, while the chisel-edge, or center, angle is the angle between chisel edge and lip as viewed endwise. Both angles, as well as lip relief and helix angle, vary with the material being drilled, as shown in Table VII



LIP RELIEF is of major importance in sharpening. Without relief, as in (*a*), lip and heel would lie in the same plane and the cutting edges could not advance into the metal but only rub. Giving relief to the cutting edges, as in (*b*), permits penetration of the metal. But a constant relief, sufficient at the periphery, would not be adequate at the center, but would cause the point to drag back of the lip. On the other hand, a constant relief that is sufficient to clear the center would give excessive relief at the periphery and cause the lips to wear abnormally or chip, as in (*c*)

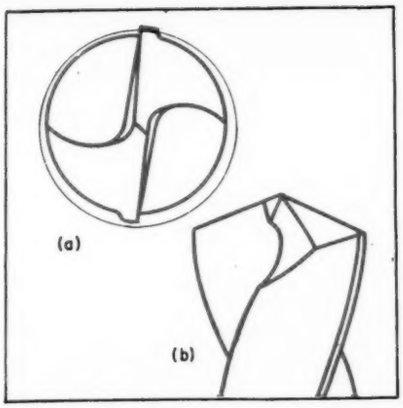


DRILL SHARPENING consists in grinding the two lips to the same length, the same and correct angle with the axis, and with the proper relief. Suggested for drills over ⅜ in., machine grinding may be automatic or hand-fed. Automatic grinders require only chucking of the drill which is then revolved a part turn automatically as the wheel oscillates back and forth across the drill lip and advances outward toward the drill point, thereby grinding an increasing relief from periphery to center. The hand-fed grinder here shown provides lip relief as the drill is swung around the axis of the bracket in grinding each lip. Light cuts and alternate grinds are made until the drill is sharpened

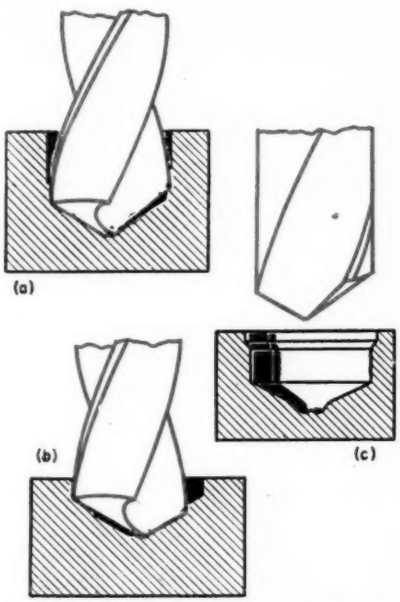
DRILL INSPECTION

Drills should be inspected carefully after each re-sharpening to insure their being held to correct relief, angles and dimensions. One drill manufacturer recommends inspection procedure to determine if the following requirements are met:

1. Lips must be 180° apart.
2. Drill web must be central.
3. Lips must be of the same height.
4. Chisel edge must intersect the drill axis.
5. Chisel edge must be at the proper angle with the lips.
6. The included angle of the point must be as specified.
7. Lip relief must be as specified.



WEB THINNING may be necessary after the lips are ground, because the web is made thicker toward the shank and the length of the chisel edge increases until excessive pressure is required to start the drill. Thinning may be done offhand against an A-60-N-5-V wheel, care being taken to maintain the exact center and not to carry the ground part too far up the flute as it may weaken the web. The most common method, in (*a*), is done on a round-faced wheel. Notched thinning in (*b*), done with a sharp-cornered wheel, is suggested for hand feeding as in turret-lathe work



DRILL POINTS, incorrectly ground, may cause oversize holes, drill binding and abnormal strain on the drill press. If lip angles differ, as in (*a*), one lip does most of the cutting, the drill may bind in the hole and the hole is made larger than the drill. Lips of different length, (*b*), also cause oversize holes and so much wobble that the drill wears rapidly and the drill-press spindle bearings may break down. Both conditions may be combined, as in (*c*), in extremely poorly sharpened drills

TABLE VII — DRILL-POINT ANGLES

MATERIAL DRILLED	POINT ANGLE	LIP RELIEF	CHISEL-EDGE ANGLE
Low-carbon and cast steel	118	12-15	125-135
High-speed steel	135	5-7	115-125
Nickel Steel	118-150*	5-7	115-125
Nitriding steel (free machining)	118	10	125-135
Stainless steel	118-140	5-7	115-125
Manganese steel	150	10**	115-125
Forged steel	118-125	12-15	125-135
Cast iron	90-118	5-7	115-125
Copper	100-130	10-15	125-135
Brass and bronze	118-125	12-15**	125-135
Bronze (hard)	118	5-7	115-125
Aluminum alloys (deep)	118-130	12	125-135
(shallow)	90-120	12	125-135
Magnesium alloys (deep)	118	12-15	135-150
(shallow)	70-118	12-15	120-135
Nickel alloys (soft)	118	12-15	125-135
Nickel alloys (hard)	135-140	5-7	115-125
Plastics	60-118	12-15	125-135

**Point angle increases with hardness of the material.*
***Lips are flattened slightly to reduce the rake angle. This allows use of heavy pressure in drilling hard material and prevents the drill digging in and grabbing in drilling soft material*

We Acknowledge . . .

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Colonial Broach Co.
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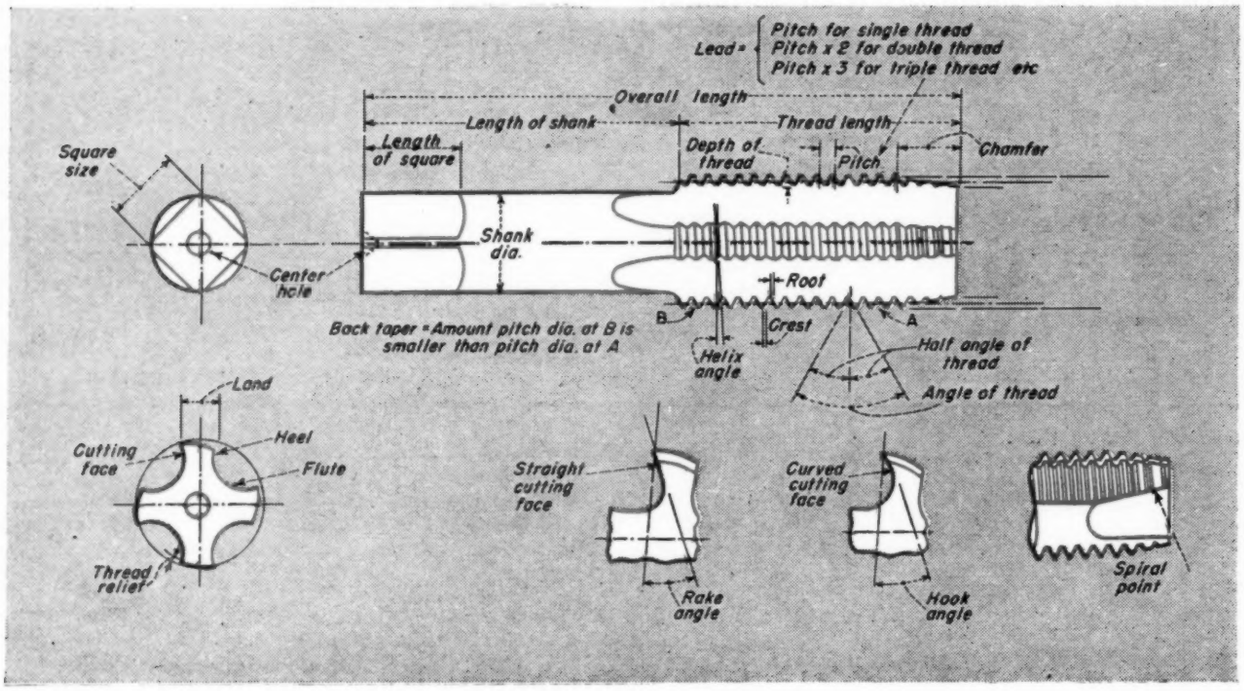
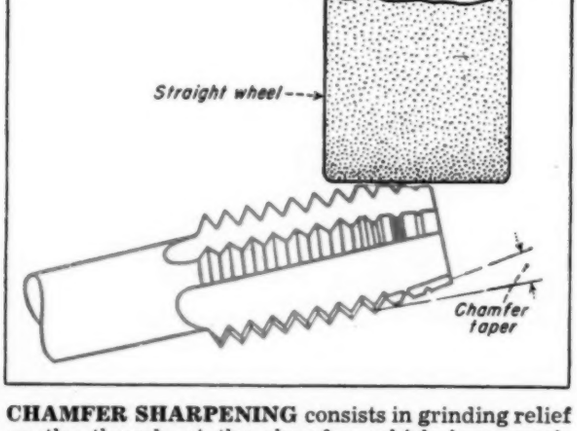
Gallmeyer & Livingston Co.
General Electric Co.
Greenfield Tap and Die Corp.
Haynes Stellite Co.
Henry P. Boggis & Co.
John Bath & Co., Inc.
K. O. Lee Co.
Kearney & Trecker Corp.
Kennametal, Inc.
Metal Carbides Corp.
Metal Cutting Tool Institute
Michigan Broach Co.
Morse Twist Drill & Machine Co.
National Broach & Machine Co.
National Twist Drill & Tool Co.
New England Carbide Tool Co.
Norton Company
Oliver Instrument Co.
Sterling Grinding Wheel Div., Cleveland Quarries Co.
Super Tool Co.
The Carborundum Co.
The Cleveland Twist Drill Co.
The Ingersoll Milling Machine Co.
The Lapointe Machine Tool Co.
The Safety Grinding Wheel & Machine Co.
The Thompson Grinder Co.
The Warner & Swasey Co.
Threadwell Tap & Die Co.
Union Twist Drill Co.
William Sellers & Co. Division, Consolidated Machine Tool Co.
Wright Aeronautical Corp.

How to Sharpen

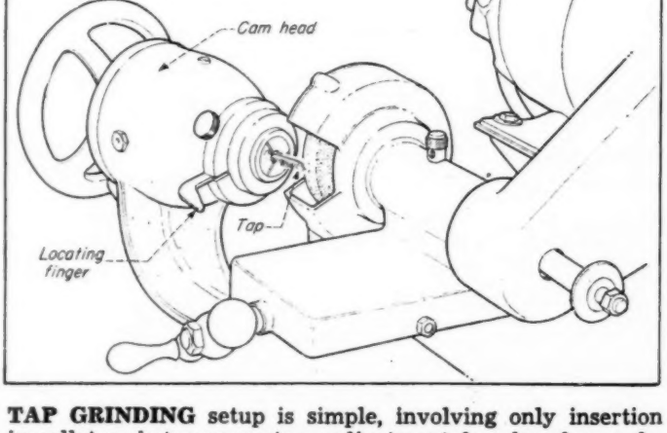
TAPS



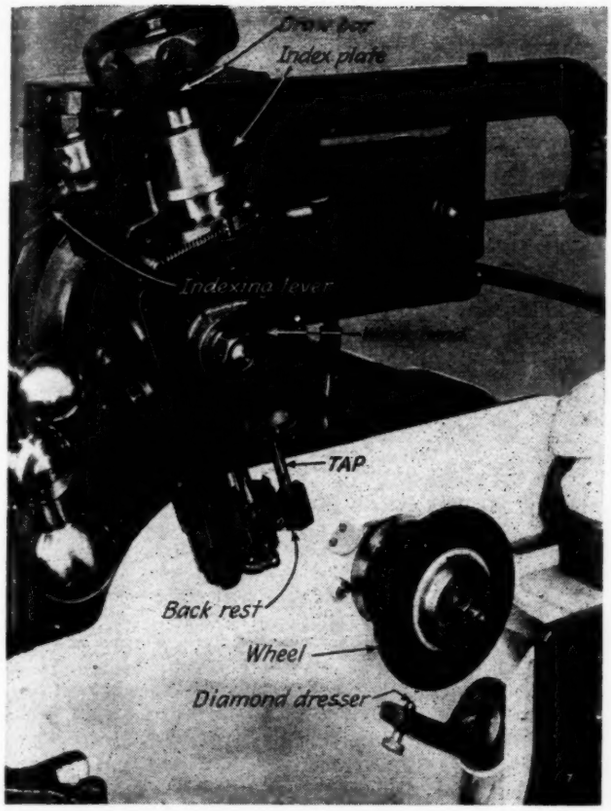
TAP NOMENCLATURE, as adopted by ASA, covers shank, body and thread terms. Of particular importance to the tool sharpener are the chamfer, rake angle and thread relief, as taps are ground on chamfer, rake or both. Some tap manufacturers recommend chamfer sharpening with occasional flute grinding, while others claim that flute grinding can be entirely eliminated if taper and clearance are properly ground. But all prefer machine grinding over hand grinding, as machine-ground taps last longer, require less power and give better finished threads. Hand grinding, except for very small taps, should be avoided



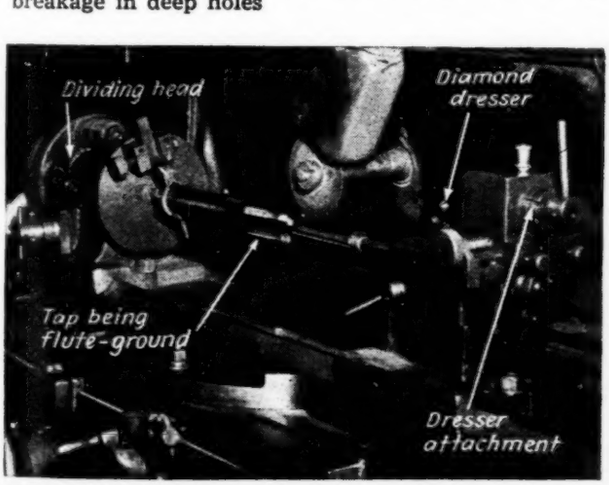
CHAMFER SHARPENING consists in grinding relief on the threads at the chamfer, which is approximately 6° for taper taps, 12° for plug taps and 20° for bottoming taps. Relief is obtained by a combination of two motions—one a rotary motion of the tap and the other, depending on the machine, an eccentric or forward motion of the tap while it is rotating. This combined motion provides an eccentric relief in the form of an arc, usually of 5°, but no standard exists



TAP GRINDING setup is simple, involving only insertion in collet or between centers, adjustment for chamfer angle, setting of cutting edge against locating finger according to number of flutes and hand of tap, and adjustment of relief mechanism—on this machine, cams adjusted by selector screws. First the chamfer is rough-ground with even rotation of the handwheel on the workhead and an in-feed of the grinding wheel. The tap is finish-ground by sparking out with a slow rotation of the tap and continuous grinding of each land



FLUTE SHARPENING, primarily for spiral-pointed taps or special taps that cannot be chamfer ground or taps that require a different rake or that have nicked cutting edges, involves grinding of cutting faces of the flutes by a wheel dressed straight for rake or to a radius that will give the proper hook. This particular machine grips the tap in a collet and supports it by a back rest directly opposite the part ground to prevent vibration and obtain a smooth flute finish. A rough flute may cause the chips to break out rather than roll out, resulting in a rough cut thread. Lengthwise scratches in the flute may fill with metal, and cause chips to cling to the flute, which may lead to tap breakage in deep holes



SPECIAL FIXTURES for flute grinding may save sharpening time on tricky jobs. This tap is being ground in such a fixture on a universal tool grinder. Flute indexing is done by the dividing head at left, and wheel dressing by the attachment on the right-hand tailstock. Only frequent use would warrant investment in a fixture of this type

TIPS ON TAP SHARPENING

1. Sharpen taps when they are dull—not an hour or a day later. Using a dull tap, instead of sharpening it often, cuts down production, generates heat, requires excessive power, produces oft size holes and rough threads, and leads to tap breakage. If a tap is used too long, the chamfer dulls so other teeth start cutting. This ruins the tap.

2. When teeth on the chamfer begin to become rounded and wear lands show, the tap is dull and ready for sharpening. At this point, don't delay—sharpen it. One company reports tap life increased from 8,000 to 40,000 holes by sharpening after 2,000 holes and every 1,500 to 2,500 thereafter. A survey by a tap-grinder manufacturer showed these results: 50 to 1,500% increase in tap life by proper sharpening.

3. Before sharpening a tap, do this:
(a) Examine tap for chipped or loaded threads and damaged thread form.
(b) Grind out single chipped or loaded threads back of chamfer to below the root diameter.
(c) Cut oft the tap when chamfer threads are damaged or when the chamfer becomes too long from numerous resharpenings as a long chamfer may cause overheating.
(d) Throw the tap away if the entire thread form is damaged, as it will probably cut undersize when resharpened.

4. Improper sharpening can make trouble on the production line. Here are common troubles and remedies:
(a) Torn threads—more rake, longer chamfer or narrower lands.
(b) Tap breakage—correct rake, larger flutes for greater chip clearance, narrower lands for greater thread relief, or greater chamfer relief.
(c) Tap loading—better finish in flutes.

5. As no simple and inexpensive method of measuring chamfer relief, amount of rake or flute form has been developed, most tap sharpening is done to visual inspection. A dial indicator is useful for checking relief drop on the land.

6. In flute sharpening, grind full length of the flute when decreasing the rake angle, but only over one to three threads beyond the chamfer when increasing the rake. Increasing rake on a straight tap by grinding on a 1 or 2° modified spiral point does not weaken the land.

7. Spiral-pointed taps have their flutes at the point at an angle to the tap axis, so the chips curl out ahead of the tap and do not clog in the flutes. Spiral angles vary with make and size of tap, ranging from about 6 to 22°. The tap is set at this angle to the wheel in grinding the flute.

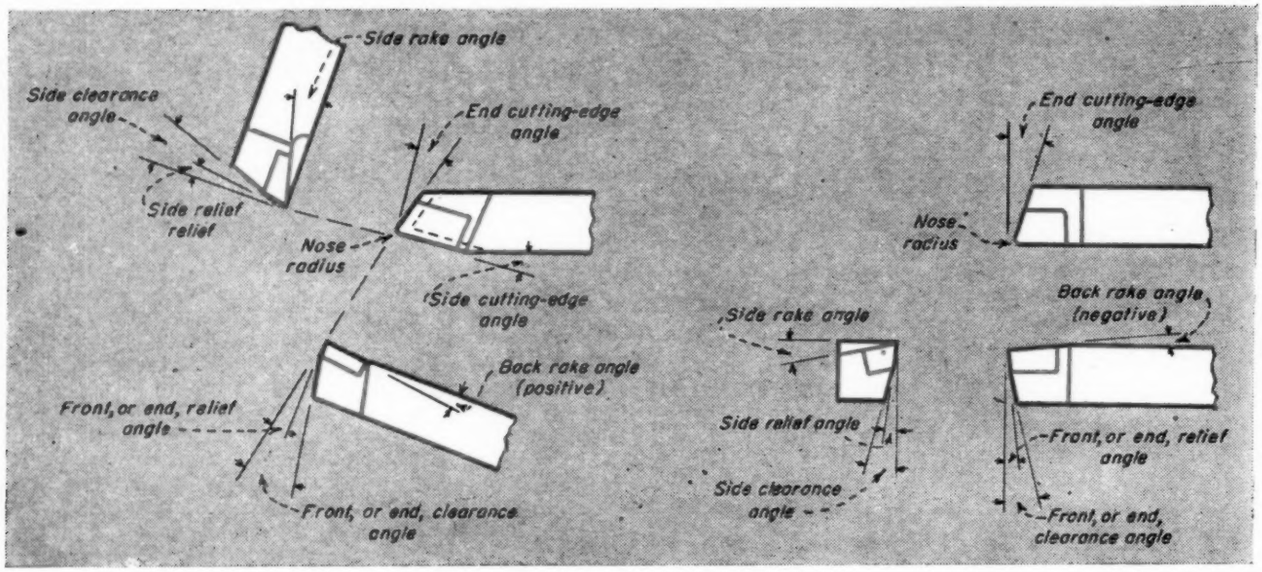
8. In grinding a tap that cuts satisfactorily, maintain the original rake angle as rake varies according to tap size and material tapped: radial or 3 to 5° positive rake for cast and malleable irons and brass, 10 to 15° rake or hook for carbon, nickel-chromium and nitriding steels, 15 to 18° hook for aluminum alloys and 10 to 15° for magnesium alloys. If too little rake is ground on the tap it requires excessive power and does not hold size well. Too much weakens chamfer teeth and shortens life between grinds.

9. Lapping flutes with a pencil wheel increases life between grinds and eliminates possible loading of flute scratches.

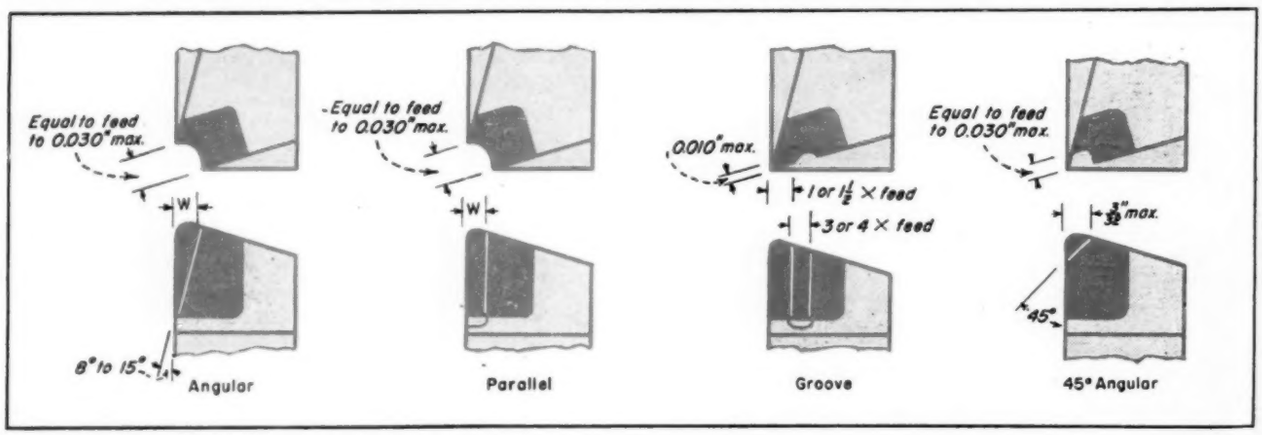
10. Suggested wheels are A-60-J-5-V for grinding chamfer, A-60-R-0-R for flute grinding in small taps, A-46-L-5-V for fluting large taps and A-60-O-8-K for cutting oft. For wet grinding, which gives far better finish, both chamfer and flute can be ground with a 180 to 320 grit and K, L or M grade.

How to Sharpen

SINGLE-POINT TOOLS



TOOL-ANGLE NOMENCLATURE for single-point tools applies to solid, bit or tipped tools of steel, cast alloy or carbide. Angles and shape vary with application and tool material. Rake angles determine free-cutting properties of a tool, with negative back rake increasing tip strength, while relief angles prevent rubbing of tool on the work. Too little relief means rapid tool wear, and too much means insufficient support for the cutting edge. A suitable side cutting-edge angle (8 to 45°) takes initial load on stronger part of tip, reduces chip pressure because of longer effective cutting edge and prevents sudden break-through at end of cut. The end cutting-edge angle (4 to 15°) clears the work; too little causes chatter because of tool drag. The nose radius (1/64 to 1/16 in.) determines point contact; too large a radius causes chatter, a built-up edge and tool abrasion

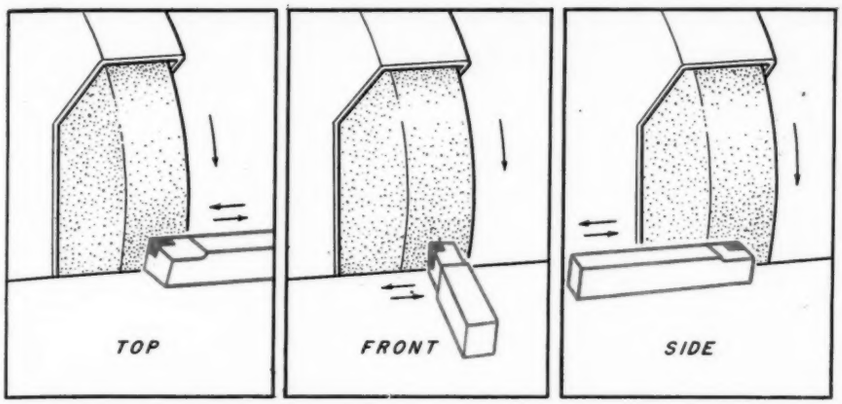


CHIP BREAKERS, needed for uninterrupted cuts on tough or stringy steel, control chips by stressing them to the breaking point, making for easy disposal. The widely used 8-15° angular breaker is for finishing or boring cuts of constant depth. The parallel breaker is for light feeds (0.005 to 0.018 in.), very stringy steel and cuts extending to a shoulder. The groove breaker is for low speeds, 0.012-to 0.065-in. feeds and varying depth of cuts. The 45° angular breaker is for light high-speed finishing cuts of 1/32-in. maximum depth. Chip breakers must be duplicated exactly each time a tool is sharpened

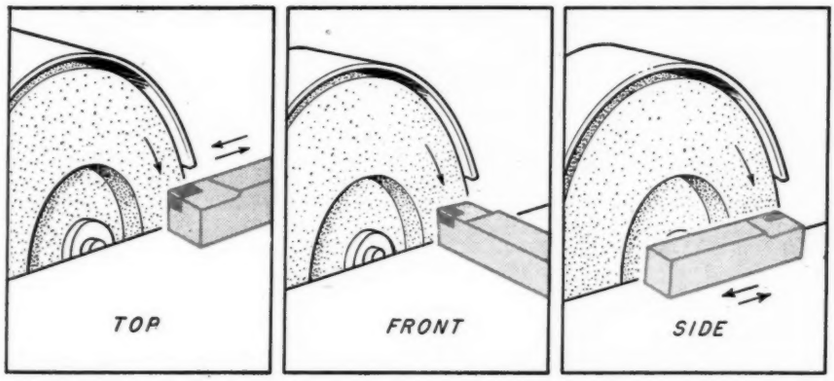
TABLE VIII — CHIP-BREAKER WIDTHS

(Angular and Parallel Breakers)

DEPTH OF CUT	FOR FEEDS (IN. PER REV.) OF 0.006-0.012	0.013-0.017	0.018-0.027	0.028-0.035
1/64-3/64	1/16	5/64	7/64	1/8
1/16-1/4	3/32	1/8	5/32	3/16
5/16-1/2	1/8	5/32	3/16	3/16
9/16-3/4	5/32	3/16	3/16	3/16



OFFHAND SHARPENING practice, not recommended for production tools except by trained operators with adequate grinding and checking equipment, varies with tool material. Following methods apply to carbide especially and to high-speed steel and cast alloy in general. Before rough grinding a carbide tool, the steel shank must first be ground back from the tip by an aluminum-oxide wheel, so steel does not load the straight, 14 to 20-in. silicon-carbide wheel. Roughing operations are to grind top face, front clearance and side clearance in order given. Clearance angles should be ground 2 to 4° greater than relief angles, and a 1/32- to 1/16-in. land left at the cutting edge. Tool should be kept moving back and forth across wheel face and rocked in both directions to prevent localized overheating of tip and to assure uniform wheel wear. A medium on-and-off pressure keeps wheel free-cutting, permits fast grinding and does not overheat tip as does too light a pressure. Grinding tip and shank alternately prevents overheating. When shank must be ground by silicon-carbide wheel, the wheel should be dressed frequently



FINISH GRINDING on either cup or rim wheel follows same steps as rough grinding, except that the top face is not ground if there is a chip breaker. The tool is moved back and forth only, as the large tool rest, used for truing the angles, cannot be rocked. Nose radius is formed by swinging tool in an arc from side-cutting edge to end-cutting edge, blending in the radius tangent to the cutting edges. When side and front relief angles differ, they can be blended in by setting grinder table at the greater angle and placing tool on a wedge block having an angle equal to difference between relief angles

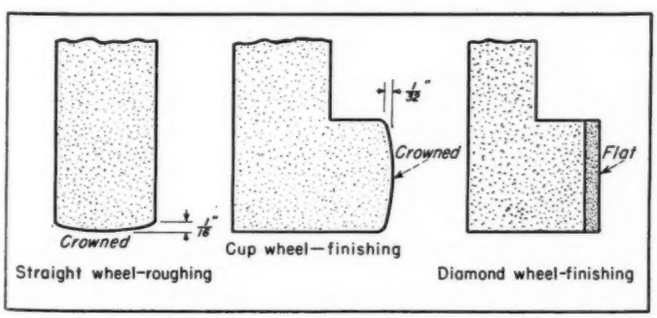
WHEEL MAINTENANCE FOR CHIP-BREAKER GRINDING

The face of a chip breaker must be flat to produce correct rake angles and its shoulder must have a radius of 0.005 to 0.015 in. to control chip deflection. Therefore, wheel shape and cutting properties must be maintained. If the wheel corner wears rapidly, but face is true, the wheel can be reversed on the spindle. When both corners are rounded or when the wheel loses shape or becomes dull or loaded, it must be dressed. Three ways to dress a diamond wheel are:

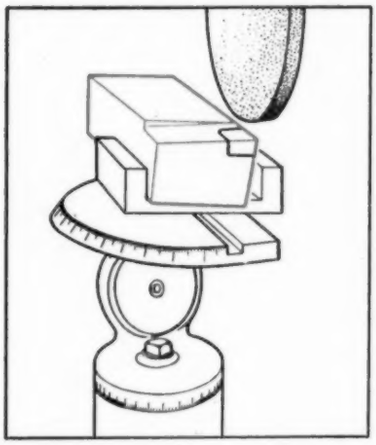
1. Set up the wheel in a cylindrical or cutter grinder or in a lathe equipped with a tool-post grinder. Grind the wheel with a 60-grit, medium-hard, silicon-carbide wheel to correct shape and radii. Rotate diamond wheel at 100 to 400 rpm. while dressing.

2. Mount a portable grinder on the table of the chip-breaker grinder and grind the diamond wheel.

3. A resinoid-bonded diamond wheel can be dressed with a high-speed-steel, hardened tool-steel or pure molybdenum tool bit. Clamp the bit in vise and surface grind, feeding the bit under the wheel and moving the table traverse at the same time. Continue dressing until the wheel face is flat. Take 0.001-in. depth of cut per pass. always feeding the tool bit into the diamond wheel from the same side.

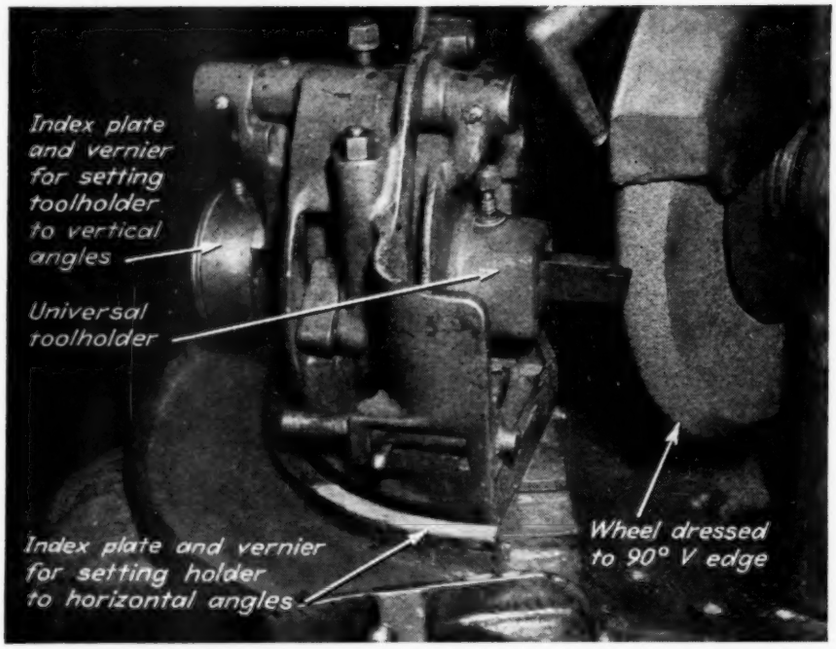


WHEEL DRESSING for carbide-tool offhand sharpening should be done frequently by a star dresser, with the wheel turning into the table, to keep silicon-carbide crystals exposed. A center crown on a silicon-carbide wheel, 1/16 in. for roughing and 1/32 in. for finishing, keeps contact area with tool small, provides cooler and faster cutting, makes it easier to grind straight cutting edges and is easier to maintain than a straight face. Diamond wheels for finishing carbide tools are left flat and cleaned with lump pumice or a silicon-carbide stick



CHIP BREAKERS can be ground on a surface grinder or a tool grinder with a work-holding fixture or vise with 3 or 4 adjustments. Accurate micrometer adjustments are a "must" to control feed. Carbide tools require a resinoid-bonded, 100-grit, 4 to 6-in. O.D., ⅛- to ¼-in. wide diamond wheel or a vitrified-bonded, 150 grit, 4-in. O.D., ¼-in. wide diamond wheel, both with light feed and rapid table travel to avoid surface checking. Vertical feed of 0.0003 to 0.0005 in. per pass is safe with one pass per second. Wheel should be kept clean by kerosene-moistened wick or a soluble oil coolant. Breakers are ground *after* rough grinding. Tool is set for breaker width by a machinist's square or graduated cross-slide. After grinding to desired depth, several passes should be made without feed to free up the cut

CONSTANT RELIEF ANGLES, measured in the feed direction, provide more uniform support to the cutting edge and maximum material available for greater heat dissipation, as compared to uniform relief, measured radially. Constant relief (feed direction) is generated in three principal steps: (1) offhand grinding to templet of a master tool, (2) cam grinding and (3) relief grinding


Index plate and vernier for setting toolholder to vertical angles
Universal toolholder
Index plate and vernier for setting holder to horizontal angles
Wheel dressed to 90° V edge

MACHINE GRINDING means better tool finish, greater production life, exact reproduction of tool angles, minimum material removal, more rapid shaping and sharpening. One type of machine grinder holds the tool in a universal holder that can be rotated around a horizontal axis parallel to tool shank and about a vertical axis passing near the tool point. The universal holder permits any tool face to be presented to the wheel at an angle so a straight surface is produced when the tool is oscillated vertically past the wheel. To grind round-nose tools, a cam inserted in an auxiliary chuck produces a convex contour similar to that of the cam

TABLE IX — CUTTING ANGLES FOR STELLITE* TOOLS

MATERIAL	BACK RAKE ANGLE	SIDE RAKE ANGLE	SIDE RELIEF ANGLE	FRONT RELIEF ANGLE	SIDE CUTTING-EDGE ANGLE	END CUTTING-EDGE ANGLE
Steel	8 to 20**	8 to 20**	7	7	10	15
Cast steel	8	8	5	5	10	10
Cast iron	0	4	5	5	10	10
Bronze	4	4	5	5	10	10
Stainless steel	8 to 20**	8 to 20**	7	7	10	15

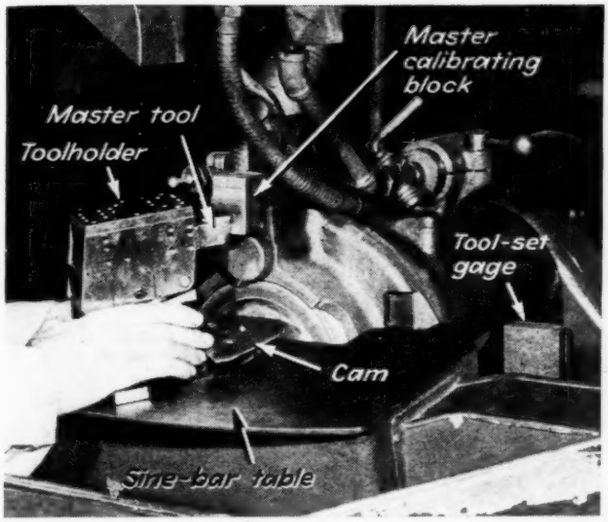
HAYNES STELLITE COMPANY

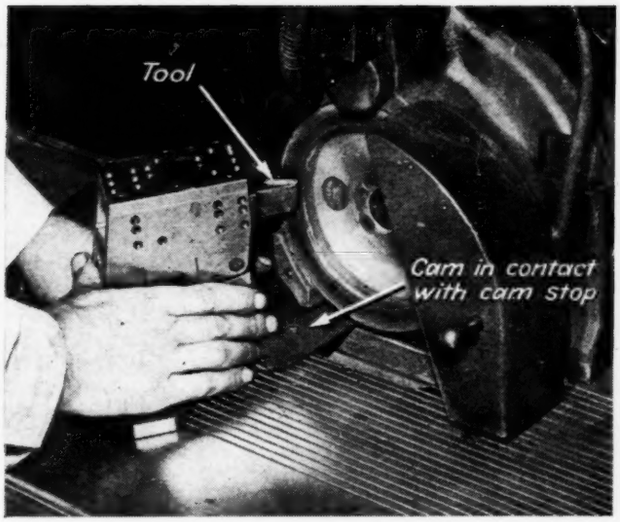
*Stellite 98M2—turning tools.
**Angle depends on grade and type of steel. Boring tools use same rake, but greater relief to clear the work.

TABLE X — CUTTING ANGLES* FOR CARBIDE-TIPPED TOOLS

MATERIAL	BACK RAKE ANGLE**	SIDE RAKE ANGLE**	SIDE RELIEF ANGLE	FRONT RELIEF ANGLE
Steel (soft)	0	4 to 8	7	7
(hard)	0 to —5	0 to 4	5	5
Cast iron	0	4 to 8	7	7
Brass and bronze	0	4 to 8	7	7
Aluminum	0	8	7	7
Copper	0	12 to 15	7	7
Plastics	0	8 to 10	7	7

*Angles given are suggested for average operating conditions.
**Side rake varies with depth of cut. For steel, for example, a side rake of 4° is satisfactory for a cut ¼ in. or over in depth, while 8° is satisfactory for a cut less than ¼ in. Back rake varies with tool size: 6° side rake and 2° negative back rake are satisfactory for large tools, and 6° and 0° for tools less than 1 in. high.





CAMS, tool steel or plastic, are ground by setting the sine-bar table to side relief angle and toolholder to end relief angle desired. The master tool is pressed against the master calibrating block to grind the cam templet to required profile. The tool to be resharpened is placed in the toolholder and set in proper position by the tool-set gage to limit stock removal to the minimum necessary

RELIEF ANGLES are ground by keeping the cam in contact with the cam stop underneath the wheel. For carbide tools, a resinoid-bonded diamond wheel is recommended. While silicon-carbide wheels are permissible in offhand grinding because pressure is intermittent, the continuous pressure in machine grinding requires diamond wheels to prevent "crazing" of the tip surface

TOOL ANGLES can be checked by protractors, gages or templets. For a large quantity of identical tools, templets provide quick checking of tool shape, relief, rake and nose radius. The gage shown checks relief, rake and lead angle of turret-lathe tools and determines tool height in machine setup

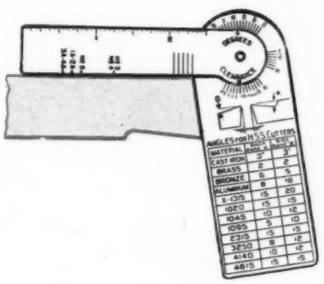


TABLE XI — GRINDING WHEELS FOR SINGLE-POINT TOOLS

TOOL MATERIAL	OPERATION	WHEEL DESIGNATION
High-speed steel	Light (offhand)	A-46-M-8-V
	Heavy (offhand)	A-46-N-8-V
	Cup wheel (machine)	A-24-M-8-V
	Straight wheel (machine)	A-30-L-8-V
Cast alloy (Co-Cr-W)	Offhand	A-46-L or M-5-V
	Machine	A-46 or 60-J-5-V
	Chip breaker	A-46-G-8-B
Carbide	Steel shank	A-24-L-6-V
	Grinding with silicon-carbide wheel	
	Roughing	C-60-I-8-V
	Finishing	C-80 or 100-H-8-V
	Finishing with diamond wheel	
	Average finish	D100 or 120-J or L-100-B
	Fine finish	D220 or 240-J or L-100-B
	Fine lap	D320 or 400-J or L-100-B
	Fine lap	Ni-Cr close-grain cast-iron lapping disk charged with No. 4 diamond dust
	Nose radius less than 1/32 in.	220-240 grit
	Roughing (machine)	D100-J or L-100-B
	Finishing (machine)	D180 to 220-J or L-100-B

HOW TO PREVENT GRINDING CRACKS

Crazing or checking, caused by forcing the grinding and overheating the cutting edge, causes the edge to flake off in service and require more frequent sharpenings. Checks are made visible by sand blasting or etching the tip in 1 part HNO_3 to 2 parts HF. To prevent crazing:

1. Use proper grit wheel.
2. Keep wheel dressed.
3. Use light grinding pressure.
4. Do not use aluminum-oxide wheels, or silicon-carbide wheels of too hard a bond, on carbide tools.
5. Avoid poor cutting action of a low-concentration diamond wheel.

Heat cracks, larger and more easily seen, result from quenching high-speed-steel tools, which causes cracking near the cutting edge. To prevent, grind entirely dry or with ample coolant. To prevent cracks in carbide tips, usually near brazed surfaces:

1. Avoid overheating when snagging shank while the tip remains cool, because of unequal expansion of steel and carbide.
2. Use ample, uninterrupted flow of coolant, because insufficient and intermittent flow allows tool to heat up and then be cooled too rapidly.

WET OR DRY GRINDING

High-speed-steel tools—wet grinding preferred, provided coolant supply floods the work.

Cast-alloy tools—wet or dry. With wet grinding, sufficient coolant should be directed at low velocity to the point of grinding.

Carbide tools—dry grinding preferred with silicon-carbide wheels as insufficient coolant, hard to judge, damages the tools. Diamond wheels must be supplied with a flood of coolant to the wheel face.

HOW TO HONE TOOLS

Honing cutting edges lightly to remove scratches caused by the grinding wheel improves tool life. For carbide tools intended for rough-turning of steels:

1. Hone with a silicon-carbide or 320-grit diamond hone held at 45° with the top of tool and moved up and down with a slight movement along the cutting edge.

2. The width of flat, or chamfer, is related to the feed:

Feed-in.	Flat-in.
0.010-0.015	0.003-0.005
0.015-0.025	0.005-0.010
0.025-0.040	0.010-0.015

3. Hone *lightly* the back edge of chip breaker to relieve its sharpness.

4. Chamfer off the corner of the back shoulder of chip breaker at the end cutting-edge angle to a flat of 1/64 to 1/32 in.

5. For roughing cuts on scaly surfaces, increase honing at the scale line to the maximum (0.015 in.) to resist crumbling of the cutting edge.

For carbide tools intended for finish-turning of steels:

1. Hone the cutting edge at 45° to a flat of 0.002 to 0.004 in., depending on the cut to be made.

2. Hone *lightly* the back edge of chip breaker.

3. Chamfer back shoulder of chip breaker to 1/64 in.

For carbide tools intended for turning of aluminum, magnesium and plastics, hone to a sharper, keener edge by honing straight down along the relief angle for added keenness and along the top face at specified rake angles.

Table XII — CUTTING ANGLES for HIGH-SPEED-STEEL TOOLS

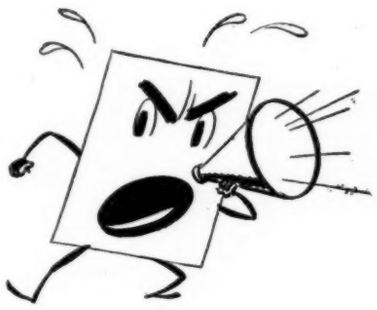
MATERIAL	SIDE RELIEF ANGLE*	FRONT RELIEF ANGLE	BACK RAKE ANGLE**	SIDE RAKE ANGLE
High-speed steels (annealed)	10	8	8	12
Tool steels (annealed)—alloy	10	8	8	12
Tool steels (annealed)—high carbon	10	8	8	12
Stainless steels	10	8	10	15-20
SAE steels—1020	12	8	16½	14
X1020	12	8	16½	14
1035	12	8	16½	14
1040	12	8	16½	14
1045	10	8	12	14
1095	10	8	8	12
1112	12	8	16½	22
X1112	12	8	16½	22
1120	12	8	16½	18
X1314	12	8	16½	22
X1315	12	8	16½	22
T1335	10	8	12	14
X1335	12	8	16½	18
2315	10	8	12	14
2320	10	8	12	14
2330	10	8	12	14
2335 (annealed)	10	8	12	14
2340 (annealed)	10	8	10	12
2345 (annealed)	10	8	10	12
2350 (annealed)	10	8	10	12
3115	10	8	12	14
3120	10	8	12	14
3130	10	8	10	12
3135 (annealed)	10	8	10	12
3140 (annealed)	10	8	10	12
3250 (annealed)	10	8	8	12
4140	10	8	12	14
4340	10	8	8	12
6140 (annealed)	10	8	10	12
6145 (annealed)	10	8	8	12
Aluminum	12	8	35	15
Bakelite and other pressure molded plastics	12	8	0	0
Brass—free-cutting	10	8	0	1 to 5
red	10	8	0	0 to —4
yellow	10	8	0	0 to —4
Bronze—cast	10	8	0	0 to —4
commercial	10	8	0	0 to —4
free-cutting	10	8	0	0 to 5
hard	10	8	0	0 to —2
phosphor	10	12	10	0 to —2
Cast iron—gray	10	8	5	12
Celluloid and other cast and formed plastics	14	10	0 to —5	0
Copper	14	12	16½	20
Copper alloys—harder	10	8	0	0 to —2
softer	10	8	0	0 to —4
Fiber	15	12	0	0
Formica gear material	15	10	16½	10
Nickel iron	15	13	8	14
Micarta	15	10	16½	10
Monel metal	15	13	8	14
Nickel	15	13	8	14
Nickel silvers	10	12	10	0 to —2
Rubber—hard	20	15	0 to —5	0 to —7

**A front relief of 8° and a side relief of 10 to 12° are fairly standard for hand-ground tools. In some cases smaller relief angles can be employed, but are only recommended for production jobs. On screw-machine work, rake angles are usually reduced also to break up the long curly chips that would be otherwise produced. Front relief of 4 to 5° is suggested for shaper and planer tools set vertical.*

***In general, where negative side and back rake angles are mentioned, these are to be used when evidence of hogging is manifested but ordinarily the 0° rake will be satisfactory.*

ALLEGHENY LUDLUM STEEL CORPORATION

TALKING SHOP



Planned Training

TRAINING PROGRAMS must be planned to meet future demands, as well as to correct present deficiencies, according to George T. Christopher, president and general manager, Packard Motor Car Co., speaking before the Michigan Industrial Training Council. "Unfortunately, we are generally trying to train people to meet a condition that is, or has been, with us for some time. . . but training should be planned on anticipated conditions. . . . Every individual must be sold on the importance of his contribution to the complete operation."

800-hp. Machine Tool

MUCH RECENT TALK has centered about larger-sized motors (50 to 75 hp.) on machine tools and the increased cutting speeds that result. But Ingersoll Milling Machine Co. has dwarfed such power with a miller that has an 800-hp. motor. The cutter, largest carbide tool made thus far, is 92 in. in dia. A real problem, solved by automatic conveyor, is chip removal —at the rate of 125 bushels a minute.

Brain Galleries

ELECTRICAL CONTROLS for machine tools are taking an increasing amount of space—some more than the machines they control. This is especially true if allowances are made for clearance for the cabinet door. Double doors reduce the space required, but the eventual answer is probably a mezzanine for controls—a gallery for modern electrical brains. There also will be space for controls and drives for the feeding and transfer equipment that modern cutting speeds make necessary.

No Check—No Pay

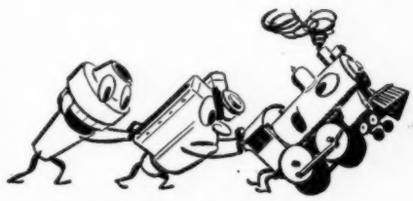
DURING THE WAR, one tool builder had two days in which to give a price and estimate through the U. S. government to Russia. Required were delivery date, number of crates, volume of crated machines, and total weight. In the emergency, a rough estimate was given. The actual shipment was about 3000 lb. under it. Our government paid, but Russian payment is still being held up because of "short weight."

Russian Discipline

ONE BUILDER supplying machine tools to Russia wondered why his machines were reported incomplete on arrival. The Russian purchaser's explanation was: "Parts were probably stolen during the uncrating by workers who had similar machines and needed the parts for maintenance. It's up to the men who get the new machines to make them run. Each mechanic has 10 to 30 apprentices he must teach to operate new machines. Failure means 'labor battalion' for both teacher and students. What's more, I have to take those 'missing' parts home with me—my family are held as hostages for me."

Press Machining

"MACHINING" MARKS on a forged product make money for a certain manufacturer. In the trade, the machine product commands more money, probably because buyers recognize that machining costs money. So when the manufacturer decided to change to a forged product, he had dies sunk with tool marks at the proper locations so his forged item still looks like a machined part, and sells for the same price.



Farewell, Choo-choo

EXECUTIVE of one locomotive-building company says the steam loco is done. Money for financing is cheap, so railroads are shifting to diesel locos. Their higher availability enables each to retire three or four steam jobs. To take care of the looming gas turbine, new diesel locos are designed for ready replacement of the prime mover.

New V-8

V-8 AUTO ENGINES present interesting design. Holding the angle of the V to 25° enables one cylinder head to cover both rows of heads. Intake manifold is down the center, valves in the head. The cylinder block is extremely compact, the engine being no longer than a 6-cyl. The crankshaft is simpler too; crankpins are no longer at 90° to each other, but at 180°. This makes a 1-plane forging.

Firing is at 25 to 155° alternately, order being 1-7-3-5-6-2-8-4, with a 4-throw crankshaft and side-by-side rods, cylinders 1, 3, 6 and 8 being on one side of the V, 2, 4, 5 and 7 on the other. With an 8-throw shaft (arranged two and two) firing is still at 25 and 155°, in the order 1-5-3-7-8-4-6-2. Designers claim very smooth operation, say only two counterweights are necessary and that a torsional damper may not be needed.

Stay Cool

MAXIMUM operating temperature permissible on the drive motor for a high-speed machine tool may be the factor that controls production. So much power is required to reverse a high-speed motor drive that it is difficult to dissipate resulting heat fast enough. Machine-tool builders are improving cooling and ventilation—even providing separate power-driven blowers. One user has shifted to left-hand reamers for a turret-lathe to avoid a reversal.

ROUND TABLE

Whose Job Is Methods Improvement?

"Well, Ed, I see Jim Wilson got boosted up to supervisor of the methods improvement gang. That's quite a break."

"Sure, Al, but I'll be darned if I can see any sense in that whole job. We're really slipping when we have to pay a bunch of men for work like that. I thought we were supposed to be cutting expenses around here."

"Now, wait a minute. You sure surprise me. Don't you believe in methods improvement?"

"If I didn't, I wouldn't be here now, but why tack on a buck-board full of fancy names and hire a bunch of engineers to try to do the same thing us foremen have been doing for years?"

"I don't think you quite understand. Those guys aren't supposed to do your methods work. They're hired to do more of the same thing and to coordinate the methods work that you and all the other foremen do. You might say that you foremen have done such a good job that these engineers are here to help you do a better job."

"That's a polite way of putting it, Al. You say those fellows are helpers, and yet they snoop around in our departments and tell us what to do. When did 'helpers' start doing that? Yes, and I've heard about the salaries some of them get. When did helpers start getting more than the guy they help?"

"I should start singing 'It's the same old story,' Ed. A good foreman has administrative and mechanical ability and a lot of good 'know how' but he hasn't and isn't expected to have the technical knowledge to improve methods when engineering problems are involved. It's a real job, and it's likewise a full time man-sized piece of work. Why, some of the planning on big improvements takes weeks! A foreman couldn't begin to find time to do that."

"Why don't they just do all of it then? Why do they tell us foremen we're still supposed to improve methods?"

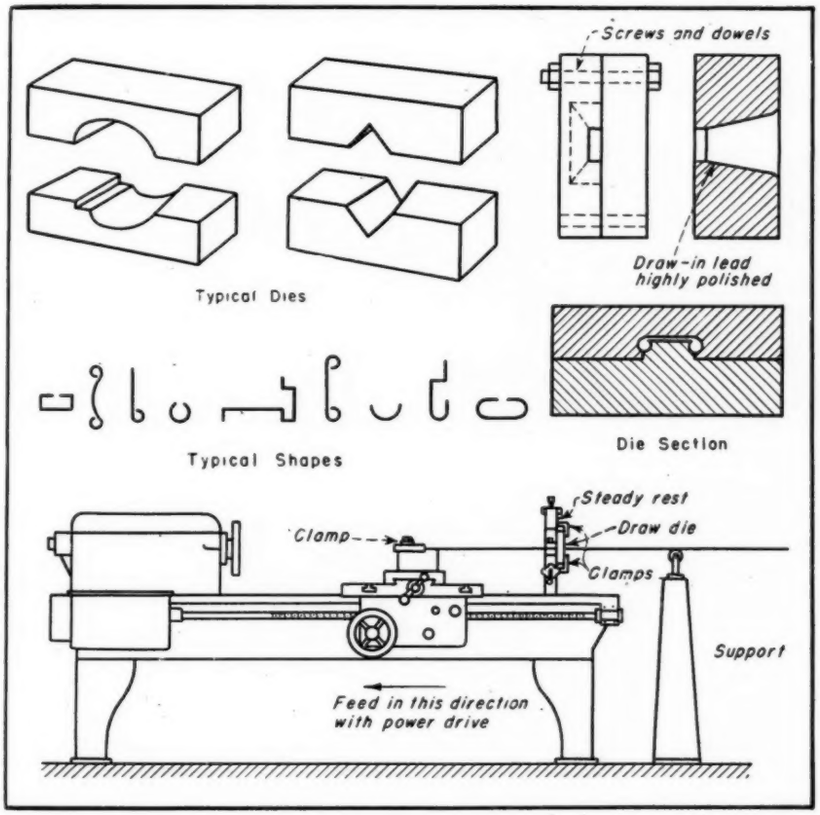
"You feel like you're abused, but you are relied upon because you're closer to the jobs and know more about what goes on in your department than anybody else. So you should be 'method conscious' and spot improvement opportunities. If it's a big job, you can turn it over to the methods improvement men. They'll cooperate."

"Yes, they're only too willing to cooperate and take credit for the idea, while I get just a headache because they're getting the workers all riled up. You know how rumors build up when someone from outside spends a lot of time looking around the department! I think, Al, that us foremen should still do the improvement work, and if we haven't got time, they can give us someone to work on the details."

"I can't agree with you, Ed. Foremen should be 'method conscious' and should cooperate with a group of trained engineers in order to get real results. Of course, the engineers must be tactful and cooperative too. With a central clearing-house for method improvements and a lot of cooperation, you can get maximum results."

***CAN THE FOREMAN** handle methods improvement under today's rush and complexity? Are today's foremen competent to do it? Who can best develop new methods? Your ideas and opinions will interest others. Discussions of earlier topics appear on later pages.*

Practical Ideas



Engine Lathe Becomes Draw Bench

With drawing dies bolted in the steadyrest and a work clamp fastened on the carriage, almost any shape can be drawn in sheet metal. Length of piece and heaviness of stock are dependent only upon the size of the lathe and the amount of stress the leadscrew can safely stand.

Dies can be one or two piece depending on the complexity of the shape; two-piece dies are held together with two screws using two dowels for alignment. The draw-in lead should be well tapered and highly polished, and the lead end of the stock should likewise be tapered and doubled over for added strength where the shape is begun. Complicated shapes may require two drawings for best results. A good grease lubricant or soap should be used to reduce friction to the minimum.

If a piece longer than the lathe bed is required, it may be possible to make a special clamp which will grab the finished shape at some intermediate point without crushing. If this is possible, the length is unlimited. *J. C. Brenner, New Hyde Park, L. I., N. Y.*

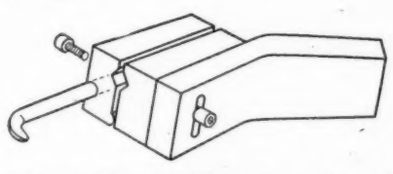
Haywire Thread Indicator

During our rush season I was set up to some 11½-pitch thread chasing on a lathe when I noticed that the thread dial wasn't working, because the gear was worn out. The mechanism was the type that is enclosed within the apron and time wasn't available for the required overhaul so I developed this expedient.

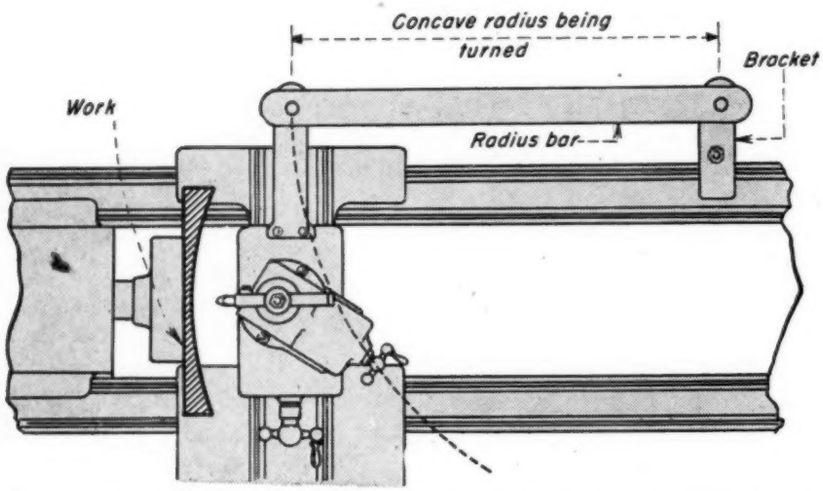
A piece of haywire was simply hooked over the leadscrew with one end hanging down to act as an index and a handle. To cut 11½ T.P.I. on a 4 T.P.I.-leadscrew, the half-nuts must re-close on the leadscrew any multiple of 2 in. from the position of the original closure. The work was to be threaded 4 in. so I hung the wire hook just 6 in. from the edge of the apron before starting to cut. The extra 2 in. were allowed to provide room for disengaging the nuts at the end of the first cut.

While the leadscrew is turning, the hook moves along at the same speed as the carriage, because it too is just a simple nut. At the end of the cut, then, bring the carriage back until the edge of the apron just touches the hook, and the tool should be just about in position to start the next cut, as soon as the half-nuts are engaged again, move the hook back 6 in. too, to get it ready for the next cut, and so on. With a little practice, it is possible to thread just as fast with the haywire indicator as possible when using a dial.

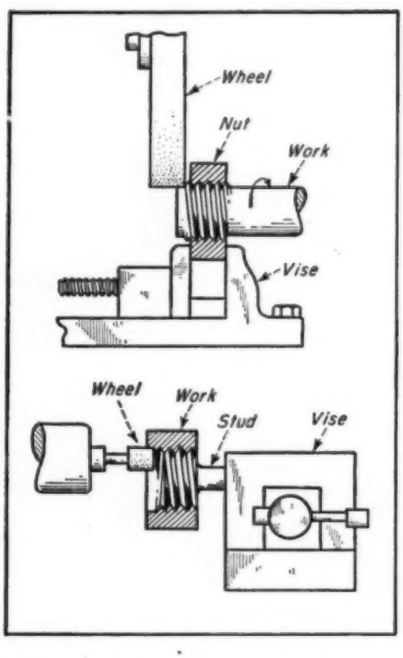
Just remember, T.P.I's which are multiples of 4 can be engaged anywhere (on a 4-T.P.I. leadscrew), even-numbered threads require engagement at every other thread or every ½ in., odd-numbered threads, every fourth thread or every inch, and multiples of ½ in., every two inches. *Daniel O'Leary, Calgary, Alberta, Canada.*



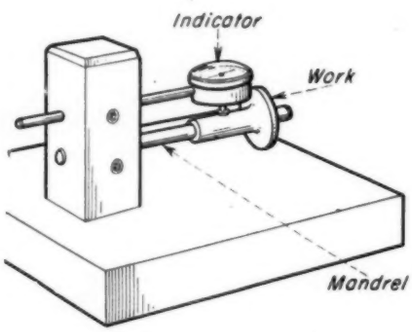
Boring Bar Holder—A strip of cold-rolled bar bent 20° and a couple of V-blocks make an excellent boring bar holder. The clamping arrangement allows for vertical and angular adjustment of the blocks and the 20° bend allows the use of long bars without toolpost interference. *Arnold Dyck, Port Credit, Ontario.*



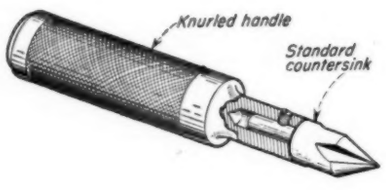
POWER CROSS FEED TURNS LARGE RADII—Free longitudinal carriage movement, restricted only by a radius bar of required length, enables the power cross feed to cut large concave or convex spherical sectors. A cross-slide extension bar and a way bracket connects the two ends of the radius bar, and final adjustments are made with the compound rest when the radius bar is parallel and the tool is at the work center. *H. George, Pittsburgh, Pa.*



Thread Remover—To remove male threads neatly and quickly, screw a nut over the thread and clamp the nut in a vise, mounted next to a grinding wheel. Feed the work slowly into the wheel by turning the screw. To remove internal threads, mount the part on a screw held in a vise and unscrew the work onto a small mounted high-speed wheel. Best results are made using several passes instead of trying to remove the entire thread at one time. *Frank W. Schrader, Paterson, N. J.*



Concentricity Indicator—Many production jobs like this hollow flanged fitting can be checked for concentricity quickly by slipping them over the mandrel which is half a thousandth smaller then the low hole limit. Rotation of the part by hand causes the wall thickness to be measured directly by the fixed dial gage. *S. M. Lounsberry, Jr., Lounsberry, N. Y.*

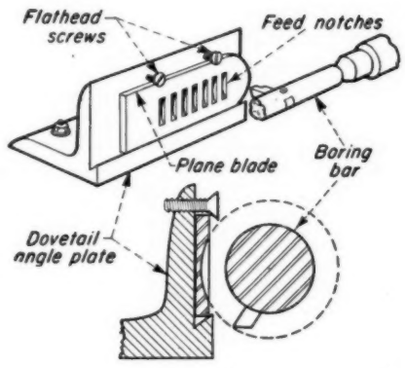


Hand Burr—A standard countersink mounted in a knurled handle of convenient diameter has been found useful in burring holes during jig and fixture making. *Frank Bilger, Nichols, N. Y.*

Lathe Cuts Notches

Notches in the back of an ordinary carpenter's plane blade presented an unusual problem for our small shop.

The work was mounted against the dovetailed notch in a piece of angle iron and held downward and inward



by two flat-head machine screws. The angle plate was mounted on the carriage parallel with the lathe spindle axis and high enough so the blade centerline corresponded with the lathe center height.

A boring bar was mounted between centers and fitted with a tool bit of correct width; the radius was adjusted to cut arcs in the work of correct length and depth.

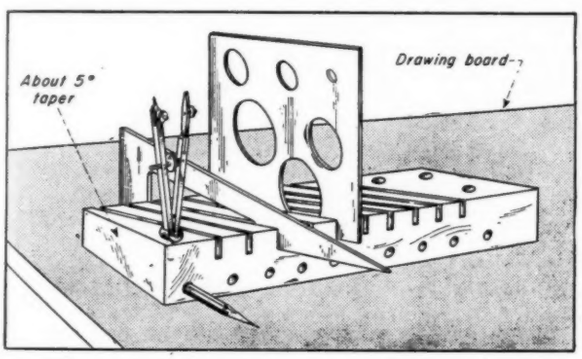
Notch spacing could be made with the compound rest set parallel to the ways, or by means of a micrometer stop, or some simpler stop made up of shims of equal thickness which could be removed one by one for each cut.

The lathe cross feed is used to advance the work into the tool for each cut to proper depth, and once this is established, a stop can be installed to prevent over-feeding on subsequent notches. The leadscrew should be stationary, of course, for this job. *U. Wheatley, New South Wales, Australia.*

Dressing Pencil Wheels—Small, complicated forms can be very difficult to dress into a mounted pencil wheel, required for access to small holes and cavities. This problem can be overcome by dressing the required form into a larger, harder and finer wheel and transferring it into the pencil wheel with the aid of a universal cutter grinder. The form cut into the larger wheel will have to be the "negative" of the desired form, of course. *Frank W. Schrader, Paterson, N. J.*

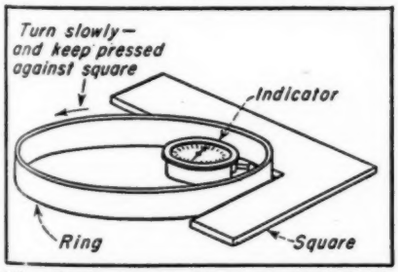
Rack Holds Drawing Instruments

Keeping tools ready for immediate use and yet out of the way when not in use, especially where a job requires a lot of hand tools which are picked up and put down frequently, is usually a difficult objective to attain. Here is an instrument block capable of holding all the pencils, triangles, compasses, dividers and pens any draftsman would normally use. Each tool is available for instant use, and with a little practice it is just as natural to return each tool to its allotted position as it is to lay it down. The block takes up very little space, and can be moved as a unit to any corner of the drawing board.

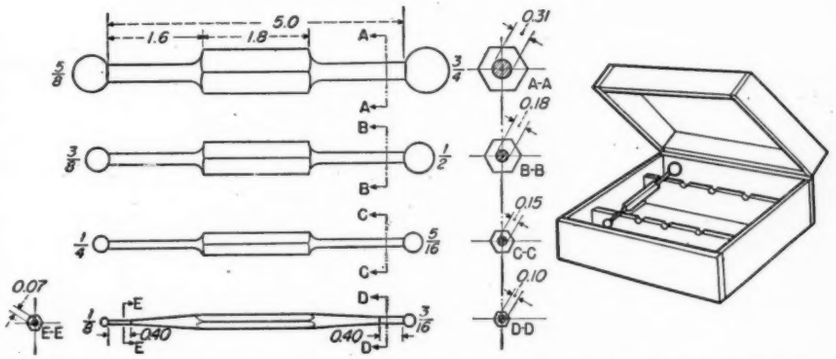


To prevent the tools from falling out when used on a sloping board, the block is made wedge-shaped and covered with felt on the bottom to prevent slipping. In addition, the felt protects the surface of the drawing, preventing smudging, and to a large extent, soiling.

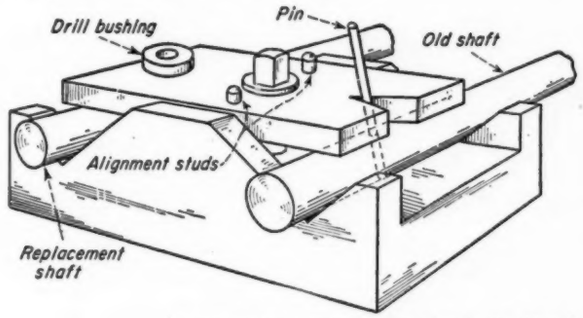
Temporary job-tool racks such as this would be handy for all kinds of hand work around a shop where a lot of small hand tools are needed for a reasonable length of time, but a whole toolbox is not warranted. *A. F. Scoblic, Milwaukee, Wisconsin.*



Circularity Indicator—A dial indicator mounted toward the apex of a steel square provides a convenient way to test short sections of tubing for roundness. *G. Wenke, Los Angeles.*



BALL GAGES CHECK DEEP RECESSES—A set of these gages which can be made with any accuracy desired and in any number of sizes will perform triple duty by serving as plugs, radius and fillet gages, and groove, slot and keyway gages. *D. H. Duffy, Wichita, Kansas*

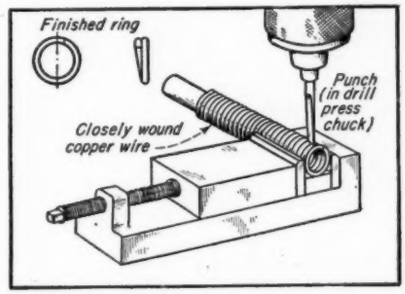


V-Block Duplicates Holes

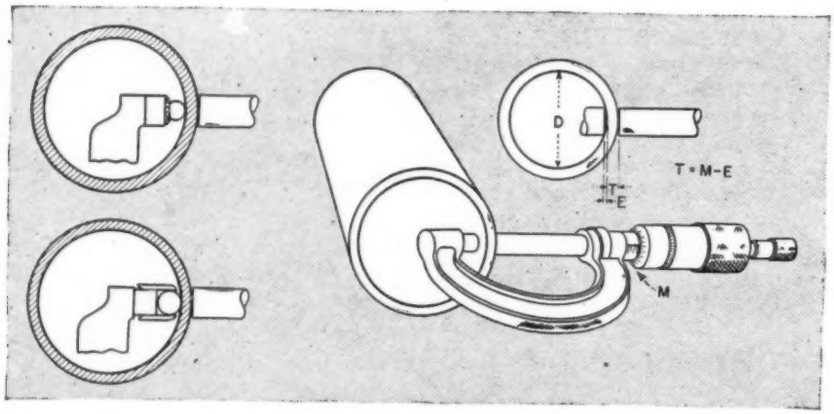
Replacement shafts require exactly duplicated holes to insure that the same gears, pulleys, etc., will fit correctly in relation to the machine to which the shaft belongs. This universal tool locates the old shaft regardless of diameter in the main V-block while a pin, fitting the hole to be duplicated, rests in another vee in the V-block cover plate. This vee is large enough to span the largest transverse hole likely to be encountered; exact location consists in turning the old shaft with the temporary pin until the pin comes as near the apex of the vee as it will go. In addition to this vee, the cover plate has a large hole to take standard drill bushings which is lined up on the centerline of the vee, and directly over the longitudinal centerline of the support vees for the new shaft.

For duplicating, the replacement stock is placed in the vees under the bushing with its end square with the end of the old shaft, or with other equivalent reference points projecting equally from the end of the block. A drill bushing of the proper size then locates the drill exactly over the spot where the hole should be drilled.

Because the unit holds both shafts at once with its integral clamp, no complicated machine setups are required, and small work in particular can be done with accuracy on a sensitive drill much faster than otherwise possible. *H. Moore, Leeds, England.*



Overlapped Rings—500 copper rings, each with ⅛-in., overlap were made successfully and quickly by winding the wire onto mandrel into a tight coil 10 in. long, then cutting the rings with a thin chisel made from drillrod chucked in a drill-press. A parallel slightly wider than the coil O.D. was placed in the vise to keep the jaws from gripping the copper, enabling the operator to turn the stock quickly after each cut. *Dana J. Mulholland, Newport, R. I.*



Micrometer Attachments Measure Tubes

When the wall thickness of a tube, pipe or any hollow cylinder is to be gaged precisely, the best tool is a ball-point micrometer. If it is not available, however, a simple improvisation is some beeswax, or grease, and a small ball-bearing ball. The micrometer reading less the diameter of the ball gives the thickness of the cylinder wall. To make sure no wax is sandwiched between the anvil and the ball to vitiate results, measure the ball diameter before applying wax and again after the ball is embedded in it.

If a gadget of a more durable nature is desired, thin-walled brass tubing of ¼-in. bore, can be beveled and slightly peened over one end to retain a ¼-in. diameter ball, and the other end rounded on the inside and provided with a double slit to obtain a spring grip on the anvil.

Once, having no immediate recourse to balls or other gadgets, I worked out the following method whose chief merit is simplicity and directness. It is capable of giving very satisfactory results with hollow cylinders of any size down to ½ in. I.D. (For I.D. less than ½ in. the anvil end of your mike will probably not enter the tube). Apply the micrometer directly. Of course the reading will be in excess of the actual thickness of the cylinder wall: but an extremely easy rule tells exactly how much this excess is for any given size of cylinder. RULE: "Divide 16 by the inside diamter D in inches to get the excess E in *thousandths* of an inch." Example: Inside diameter of a tube is 2 in. 16 divided by 2 is 8; hence actual wall thickness of tube will equal micrometer reading less 8 thousandths (0.008"). This is true of all tubes whose I.D. is 2 in. no matter what their outside diameters or wall thicknesses.

This rule, though empirical, is precise enough to give results accurate to a thousandth of an inch for diameters as small as ½ in. For larger diameters the accuracy is even better. It follows from the rule that for inside diameters over 16 in. the excess E is less than 0.001 inch. In case of such large diameters, therefore, the micrometer reading itself may be taken as the wall thickness.

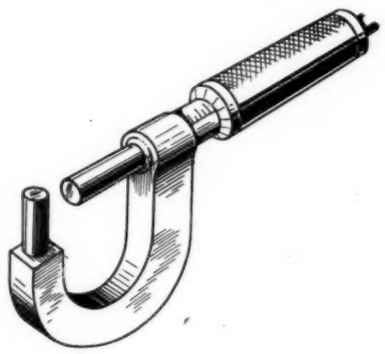
It should be noted that the arbitrary-looking figure 16 used in the rule is a constant for an anvil diameter of 0.250 in. If your mike has an anvil diameter of 0.235, or 0.270, use the constant 14, or 18, respectively, instead of 16. *S. Framurz, Bombay, India.*

Tailstock Choker — A loose collar just a trifle longer than the normal clearance between the back of the taper-shank tailstock chuck and the face of the tailstock spindle when the chuck is tightly in place, converts the chuck into a good floating driver for small drills, taps and reamers. A tight chuck used under these conditions is likely to cause breakage because there is no way to estimate the strain on small tools. The collar should be just long enough to prevent a jam fit, but not long enough to cause looseness or play. Then, when a tool binds or pulls, it will free itself instantly, and if necessary, the entire chuck can be removed and replaced quickly for clearing the chips. *T. F. Hannan, Los Angeles, California.*

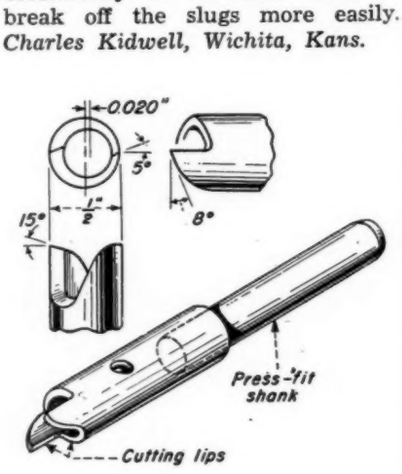
Tube Micrometer — Gaging wall thickness of very small tubing is beyond the range of even most conventional tube micrometers because the anvil is too long to fit in the bore. Most job shops haven't the room for a lot of special tools anyway, and they will resort to devious means to find the wall thickness of a curved surface. But here is an attachment for use with a standard micrometer head (which has many uses in any shop) that occupies very little room and is easy to construct.

The frame can be made of practically any material as it should receive almost no wear, but the hole to fit the barrel should be accurately perpendicular to and coplanar with the pin-anvil hole.

The pin anvil can be any diameter according to the smallest bore likely to be encountered, and it should be made of hardened drill rod. *D. E. Sweet, Marblehead, Mass.*

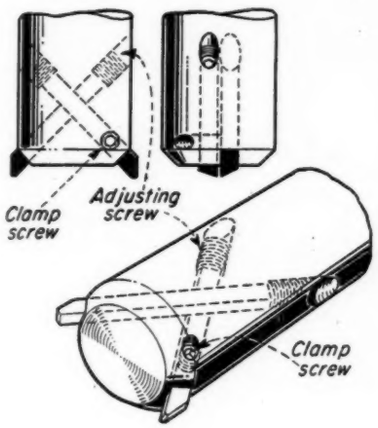


Plastic Drill—This two-flute, high-clearance drill has proved especially efficient for cutting plastic materials. Generous cutting angles, deep reliefs and the large center hole free the removed material and the eccentricity of the hole tends to break off the slugs more easily. *Charles Kidwell, Wichita, Kans.*



Boring Bar Stops Chatter

This bar should be made as large as possible leaving only chip room. It carries two standard toolbits, one at the back side of the bar to take the first and heaviest cut while the front bit follows with a lighter cut.

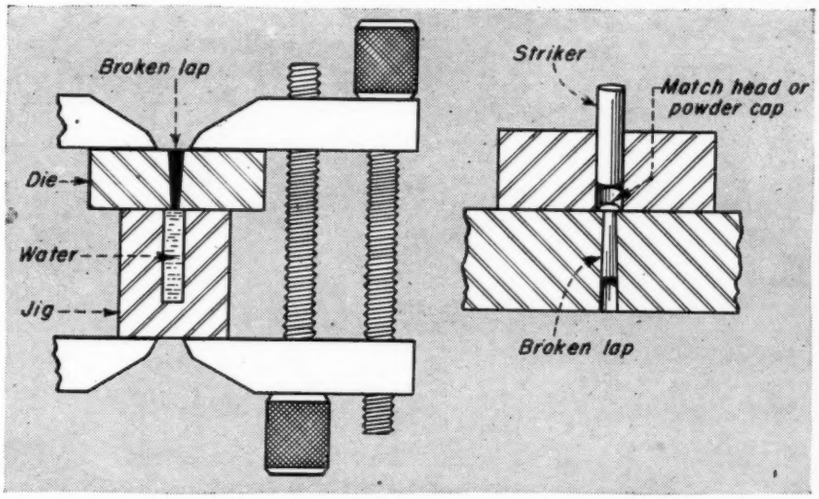


With this setting of the bits, the combined weight of the work, chuck and spindle, together with the heavier cut of the back bit, keep the revolving parts well seated on the bottom parts of the spindle bearings at all times. This makes for steady running without chatter even though the spindle bearings have some play which under ordinary contions would cause chatter.

There may be times where a trial is required to get the two bits set correctly so each removes its correct share of the stock.

This bar is for use in a turret or an engine lathe with a special clamp in place of the usual toolpost.

The same type of bar can be used with one bit for a finishing cut when extreme accuracy is required. In such cases best results are obtained by placing the bit on the back side of the bar, thus keeping the revolving parts well seated on the bearings. *Martin H. Ball, Watervliet, N. Y.*



Let Nature Take Its Course

Is my answer to the "What would you do?" predicament involving a tiny lap broken off in a nearly completed die. (See *Talking Shop* a few issues back.)

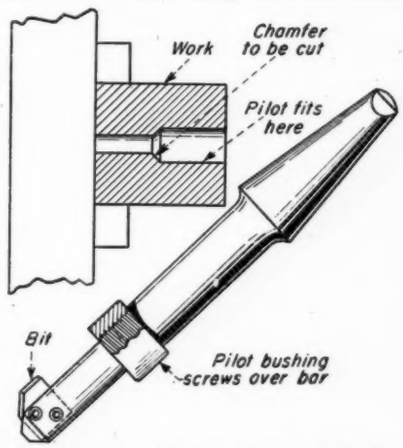
If the die is steel, grind the broken end flush with the die surface, place the head of a "strike-anywhere" match or a black-powder cap-pistol cap directly over the lap and strike with a hammer. The force of the explosion should be enough to dislodge the lap. Slightly higher efficiency could be attained with a gas-tight chamber and plunger-striker firmly held to the die surface with plenty of clamps.

If the die is carbide (or any material likely to fracture under shock) fit a water-filled block *very tightly* over the lap, clamp and put in a refrigerator. Every trace of air must be eliminated (clamp under water, if necessary) and any leakage will be equally disastrous. A small diameter deep hole is the best as clamping pressure is less while the expansion ratio is high. Chill parts before filling and clamping. *Thomas F. Haas, Milwaukee, Wis.*

Boring Bar Cuts Chamfers

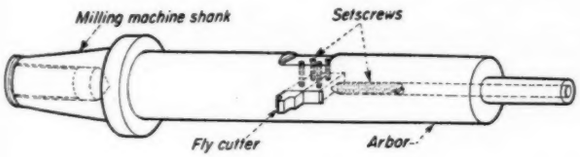
Several split forging die sets required a deep internal taper to join two coaxial bores of different diameter. The dies were made in several sizes and therefore required a different tool for each size, but this tool was made with adapters and it performed all the work very well.

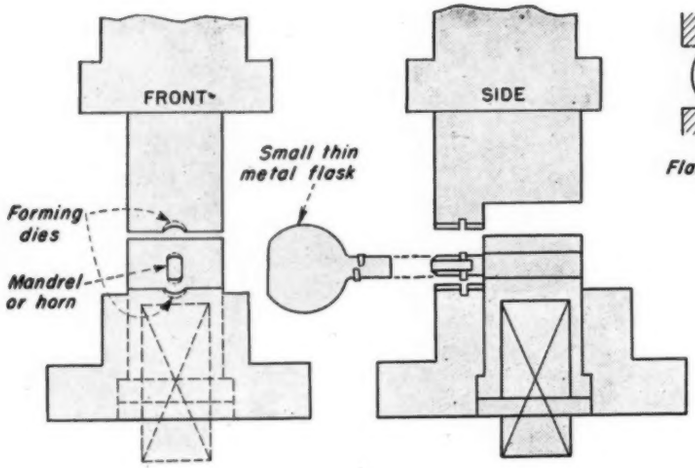
The body of the tool, with its tailstock taper shank, is more or less conventional except that it has a threaded portion terminating in a shoulder a little way back of the toolbit slot. This threaded neck is made to accommodate various pilots to guide and steady the bit as it cuts deep in the hole. The bit itself is ground at the proper angle to produce the desired taper, and after setting, it is outside ground to the hole diameter for extra support. *Frank Bilger, Nichols, N. Y.*

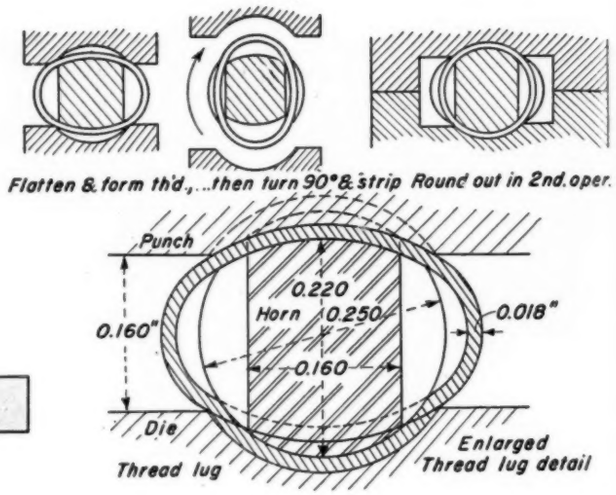


Milling Machine Arbor—A plain arbor with a wide rectangular slot having radial and axial setscrews makes a handy tool for mounting special single-point slotting cutters, form cutters and experimental tools for test purposes and special jobs.

I have found this arbor particularly useful on experimental work of many kinds. *Paul E. Marquardt, Des Planes, Illinois.*







Two sets of symmetrical die halves complete with floating horns can save time and cut cost on threading small bottles in production

Threads for Thin Tubing

Screw threads on the necks of small metal flasks or vials, or on any thin tubing for that matter, can be formed rapidly in a two-stage press operation. These 0.018-in. thick, ¼-in. neck dia. flasks will act as a good hypothetical illustration.

Two die sets are needed. The first set flattens the neck around a center horn and simultaneously forms an interrupted thread sector about 120° long on each side of the tube. When the two symmetrical forming dies open, (Actually, the ram controls the top die and the horn slides vertically against a heavy spring.) it is possible to turn the work 90° where it will slip off the horn without difficutly.

Another set of dies and a plain horn reform the neck into a circle. Adequate clearance is provided so the thread lugs remain untouched.

If continuous threads are considered worth the extra expense, they might be rolled with a knurling tool equipped with threaded rolls. This process would be much slower and require a lot more hand work. *Wallace C. Mills, Rockford, Ill.*

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(in addition to regular payment for all exclusive contributions published)

An extra payment of $25 will be made for the best Practical Idea in each number of *American Machinist*. To avoid bias, the selection will be made by readers, a different group each time.

Payment—$25 in addition to regular rates for the item as published, to be paid as soon as reader votes are received—usually three to four weeks after the date of the issue. The winner will also be announced in these pages as soon thereafter as practicable.

Judges—A group of 200 *American Machinist* readers is asked to select preferred articles in each issue. The group is a true cross-section of all readers, and changes entirely each time. Their votes, in addition to guiding the editors, will hereafter select the best Practical Idea. If at any time their votes result in tie, $25 will be paid to each and every co-winner. The decision of the readers will be final in each case.

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Who May Enter—Anyone may enter except employees of the McGraw-Hill Publishing Co., Inc., and those of advertising agencies or departments. Suggest to your employees that they submit ideas.

How to Enter—Send your entry to "Practical Ideas Editor," American Machinist, 330 West 42nd St., New York 18, N. Y.

Thirty-fifth Selection—F. Hartley's Basic Automatic Chuck

Mr. Meanor's Misdemeanors for the Stout

OR

Where to Eat in Chicago

Chicago is a big city, and the Machine Tool Show remote from good eating places. It was only natural, therefore, that a long-time resident of the Windy City should volunteer this Gourmet's Guide to Meanor Eating

We offer this proof that Gourmet Meanor knows whereof he speaks. Like that other famed seeker-out of fine foods, Duncan Hines, Meanor knows because he's been to most of the eating places he mentions. The wherewithal comes from his position as Chicago District Manager, American Machinist. Note that his middle initial is followed by no period—because it's just a letter, not a name. He's exact in that as he is in his knowledge of man's—and woman's—*primary need.*

BY ANSON E MEANOR

BEFORE telling you where to eat, let me tell you how to get there. It is easier to find your way around Chicago than in any other city. All numbers start at "the busiest corner in the world," State & Madison, East and West numbers from State Street, North and South from Madison Street. There are 800 numbers to each mile. All numbered streets are on the South Side. And in Chicago, Lake Michigan is always to the east. That is all you need to know. The Machine Tool Show at 79th St. (7900 South) and Cicero Ave. (any Chicagoan will tell you Cicero Ave. is 4800 West) is therefore 9⅞ miles south of Madison Street and 6 miles west of State Street. With few exceptions, Chicago's streets run exactly north and south, or east and west. The only two exceptions you will need to know are two diagonals running southwest, Ogden Ave., from Madison St. and Ashland Ave. (1600 west), and Archer Ave., starting at 18th and State Streets.

Either of these diagonals, to Cicero Ave., will save you time in driving to the Show. The addresses of the restaurants listed are keyed for street locations. This list of eating places is compiled for your particular benefit while attending the Show. Most outlying places, generally considered too far from downtown hotels, are omitted, with the exception of those on the southwest side close to the Show. There are no restaurants within a mile of the Machine Tool Show—in any direction. Here are those reasonably close that serve both luncheon and dinner. All serve good food and are reasonably priced. Reservations should not be necessary. Parking space is generous.

Mr. Meanor's list appears on following pages

"There is no better food than this . . ."

Feltman's Grill, 10459 S. Western Ave. (2400 West) Phone: Beverly 4061, 6½ miles from Show. Daily, except Tuesday, 11:45 A.M. to midnight. Dry. Specialty: Barbequed spareribs.

Louis L. George's Restaurant, 1759 W. 69th St. Phone: Hemlock 7866, 5 miles from Show. Daily, 11 A.M. to 9 P.M. Steaks, chicken, Seafood and Italian food. Good wine cellar.

Jules Restaurant, 814 W. 71st St. Phone: Vincennes 7533, 6 miles from Show. Daily, except Tuesday, noon to 2 A.M. Liquor served. Belgian chef, nephew of Chicago's famous De Jonghe, has unusual variety of items on menu, including Oysters Rockefeller, Shrimp De Jonghe.

Mickelberry's Log Cabin, 2300 W. 95th St. Phone: Beverly 8998, 5 miles from Show, but excellent food, well worth travelling for. Air-conditioned. No liquor. Daily except Monday, 11 A.M. to midnight.

The Nantucket, 10437 S. Western Ave. (2400 West) Phone: Beverly 6100, 6½ miles from Show. Daily, except Monday, noon to 8 P.M. Dry. Specialize in fried chicken, turkey, steaks, and prime roast ribs. Air-conditioned.

Nielsen's Restaurant, 7840 S. Western Ave. Phone: Prospect 6388, 3 miles straight east and closest to the Show. 11 A.M.to 2 A.M., liquor served.

Schaffer's Rest. & Cocktails, 2535 W. 95th St. Phone: Evergreen Park 8811, 5 miles from Show, in bowling alley operated by Ray Schalk, ex-White Sox catcher. Large and comfortable bar and dining room. Daily 11 A.M. to 1 A.M.

Chicago has many restaurants operated as private clubs: **Key Club, International Club, Tavern Club, Radio Club, Barclay Club,** etc. Some do not admit you unless accompanied by a member; others are more lenient. If some one asks you to dinner at **The Key Club,** don't miss the best food in Chicago—but you must be asked. One of these "Clubs" is **The Barn,** at 82nd St. & State Road, just 1½ miles from the Show. Phone Oak Lawn 333 for reservations. Dinner only, daily except Sunday. Excellent food and liquor, reasonably priced.

All of the leading hotels serve good food and drink. Outstanding are (be sure to make reservations):

The Pump Room, Ambassador East Hotel, 1300 N. State St., is probably the most famous place in Chicago. Very swank and ritzy. All bigwigs, society swells, and in-town celebrities dine here. Specialties served on flaming swords. Sunday "brunch" is very popular. Opens at noon. Dancing after 8:30. Tea dancing Sat. and Sun. after 3:00. Plenty expensive.

Personally, I prefer **The Buttery** across the street in the Ambassador West. *There is no better food than this.* Dancing and tea dancing same as **The Pump Room.** At **The Buttery** ask for Uncle Jack, Steve or Danny and tell them I sent you. Luncheon and dinner. [Mr. Meanor's picture (page 129) was posed at **The Buttery**—and he put the bill on the expense account.—*Ed.*]

A block away in the Park Dearborn Hotel, 1260 N. Dearborn St., (50 west) is the **Cafe de Paris.** The famous French chef is Henri Carpentier who used to feed Diamond Jim Brady. If you yearn for crepe suzettes, here's the place to get them. Dinner only, 5 P.M. to midnight. Sunday from 2:30 P.M.

Drake Hotel—**Camellia House** compares favorably with **The Pump Room.** The **Cape Cod Room** has delicious sea food. Try Bookbinder's Red Snapper Soup with sherry.
Edgewater Beach Hotel, 5349 N. Sheridan Road, seven miles North (take the Outer Drive) is justly famous for its **Marine Dining Room, Beach Walk,** and Yacht Club (cocktail lounge). Worth the drive.

Palmer House, **Empire Room,** good food and certainly the best show in any Chicago Hotel. There are several other dining rooms here.

The Glass Hat at the Congress Hotel serves more liquor than food, but is the only place in Chicago to dance in the afternoon.

Blackstone Hotel, **Mayfair Room,** good food, good orchestra, good entertainment. **The Balinese Room** and **the Grill** are excellent too.

Boulevard Room at the Stevens Hotel has good floor show, good food and is not too expensive.

The Walnut Room at the Bismarck Hotel also has fine food and a good floor show.

The College Inn, later called the **Panther Room,** of the Hotel Sherman, long the home of famous swing bands, is said to be dropping the music, dancing and entertainment, to be just another dining room.

Others of Chicago's *most* noteworthy and best places are:

Chez Paree, 610 N. Fairbanks Court (200 East). Practically tops in entertainment—Holiday said, "unquestionably one of the most ably operated night clubs in the world." Holiday also said "good food reasonably priced" but do take plenty of money.

Don the Beachcomber, 101 E. Walton Place (920 North). Don't miss this. Very famous for rum drinks and Cantonese food. Originator of the Zombie (Don will not serve more than 2 to each person) or try a Navy Grog, Vicious Virgin, Missionary's Downfall, or Pi Yi (served in a pineapple). But do drink rum here. And ask for some of the very delicious appetizers. 4:00 P.M. to 1:00 A.M. Ask for Pinky and tell him I sent you.

The Cameo Restaurant, 116 E. Walton Place (920 North). Phone Superior 1200, is one of the newest and most elegant. Fine food and wine. New Year's Eve party was $100 a plate here. Sonja Henie is said to have an interest in it.

Kungsholm Swedish Restaurant, 631 N. Rush St. (80 E.) phone Superior 9868. Closed Sunday. Currently closed by a bad fire, will probably be open by Machine Tool Show time. Best Swedish food and Smorgasbord in Chicago.

St. Hubert Old English Grill, 316 S. Federal St. (61 West) phone Webster 0770. Closed Sundays. Famous English mutton chops, and probably the most expensive place in Chicago.

Wrigley Building Restaurant, 410 N. Michigan Ave. Phone Whitehall 7600. Closed Sundays. Phil Wrigley owns it and eats here. They say he operates it on practically a non-profit basis. Fine dish is "MY SALAD," allegedly invented by PKW.

The Yar, Russian Restaurant, 181 E. Lake Shore Drive (1000 North). Phone Delaware 9300. Closed Sundays. I don't like Russian food, but if you do **this is the place for it.**

And now here are several places your wife, if she is with you, will enjoy.

Marshall Field & Co., State and Randolph St.—several restaurants and tea rooms. Delicious food. Luncheon only.

Carson, Pirie, Scott & Co., Tea Rooms, State & Madison Streets. Luncheon only.

Jaques French Restaurant, 900 N. Michigan Ave. Phone Delaware 9040. My wife loves it. In the summer you will be served in the open-air garden.

Le Petit Gourmet, 619 N. Michigan Ave. (100 East). Phone Delaware 9701. Open-air dining, French onion soup.

Parkway Tea Room, 723 N. Mich. Ave. (100 East).

Stouffer's Restaurant, 32 E. Randolph St. (150 North). Delicious food, good service. One of the best spots downtown for luncheon.

Tracy's On The Avenue, 540 N. Mich. Ave. (100 E.).

"Specialties served on a flaming sword . . ."

And now a further list of very good eating places:

Barney's Market Club, 714 W. Randolph (150 North). Barney greets everyone with "Hello, Senator!!" He had steaks throughout the war—and plenty of trouble with the O.P.A. who once said he was five million red points behind. Barney said was a "dam' lie"—he was never more than two million points behind—and that was a bookkeeping error.

Berghoff's, 17 W. Adams St. (200 South). Closed Sunday. Serving robust German food and Berghoff beer under the same management for 50 years.

Binyon's, 327 S. Plymouth Court (32 West). Closed Sundays. Excellent food and wine, fine service.

Blackhawk. 139 N. Wabash Ave. (50 East. Tea dancing Sunday. Floor show and dancing every evening. Open 11:30 A.M. daily.

Boston Oyster House, 21 S. Clark St. (100 West). In the Morrison Hotel. Sea food and steak.

Boveri Italian Restaurant, 20 E. Lake St. (200 North). Closed Sunday. Famous Italian meals. Try their spumoni for dessert.

Carder's, 118 N. Dearborn St. (50 West). Closed Sundays. Mr. Carder invented the Sizzling Steak. All the cooking is done by women. Specialties: steak, fried chicken, breads, and pastries. No bar.

Ye Olde Cellar, 322 N. Michigan Ave. (100 East). Lower level. Good food. Dancing, good music.

Chez Paul, 180 E. Delaware Place (900 North). Closed Mondays. A delightful French restaurant.

Madame Galli, 157 E. Chicago Ave. (800 North). One of Chicago's oldest Italian restaurants.

Gibby's, 192 N. Clark St. (100 West). Sammy Williams at piano and organ. (*Next page, please*)

"Deen can and has eaten 20 perch for dinner . . ."

Golden Ox, 1578 N. Clybourn Ave. (a diagonal street, 800 West at this address). If you like zither playing, alpine yodeling and good German food, don't miss this place.

Gold's, 812 W. Roosevelt Road (1200 South) is Chicago's best-known and largest Jewish restaurant. Order Jewish food and don't count calories.

Gus slaps you on the back and the bartender rings bells when you enter his tavern-type restaurant at 420 N. Dearborn St. (50 West). Men like **Gus'** steak or spaghetti.

Henrici's, 71 W. Randolph St. (150 North). Closed Sundays. For 75 years the best-known restaurant to out-of-town visitors. It still has some of the atmosphere of an old-time Chicago restaurant, plus fine food. If you go for apple pancakes, order here.

Huyler's, 308 S. Michigan Ave., and 907 N. Michigan Ave. (100 East) are considered two of Chicago's best medium-priced restaurants. The ladies like it.

Ireland's Oyster House, 632 N. Clark St. (100 West). Closed Mondays. Chicago's best-known seafood. Open kitchen. Broilers cook both sides at once.

Isbell's, 940 N. Rust St. (80 East). One of the very best medium-priced restaurants.

Ivanhoe, 3000 N. Clark St. (100 West). Seems to impress visitors more than any other in Chicago. Orchestra for dancing. No floor show. 7 bars. Don't miss the catacombs. Especially nice in summer. Make reservations.

L'Aiglon, 22 E. Ontario St. (640 North). One of the best French restaurants. Same type of food as Antoine's in New Orleans. Make reservations.

Lenard's, 1166 N. Milwaukee Ave. (500 West). Chicago's best Polish food.

Mann's Rainbo, 73 E. Lake St. (200 North). Closed Sundays. Fine "if it swims, we have it" restaurant.

Maurice's, 173 W. Madison St. Closed Sundays. Popular for breakfast—fine coffee, coffee cakes, Danish rolls, etc. Good for luncheon and dinner.

Normandy House, 800 N. Tower Court (122 East). Closed Mondays. Visit the Black Sheep Bar downstairs, with enticing murals of Frankie & Johnnie, The Bastard King of England, Casey Jones, et al. This is the only bartender in town who makes real champagne cocktails as they should be made—with brandy, and they are not expensive either.

Old Heidelberg, 14 W. Randolph St. (150 North). German elegance. High-toned entertainment upstairs. Monkeyshines downstairs.

Pete's, 165 N. Dearborn St. (50 West). Closed Sundays. For many years famous for steaks. Popular with theatrical folk.

The Pit, 875 N. Rush St. (80 East). Best place in town for spareribs. Delicious steaks and chops.

Red Star Inn, 1528 N. Clark St. (100 West). Closed Sundays. A landmark since 1900. German cooking at its best.

Riccardo's, 437 N. Rush St. (80 East). Fine Italian food. Singing waiters. Bocco game in the basement.

Ricketts, 103 E. Chicago Ave. (800 North). Smacking good food, good portions, reasonable. Men like to go here. Circle bar in the rear. Cozy, extremely so.

Schulien's, 1800 N. Halsted St. (800 West). Every magician in the U.S.A. knows Matt Schulien. He entertains at the tables and is an amazing manipulator. Good food—a place you should go at least once.

Little Bit of Sweden, 1015 N. Rust St. (80 East). Smorgasbord and well known Swedish food.

Chicago's Chinatown centers around 22nd St. and Wentworth Ave. (200 West). There are four good Chinese restaurants:

Guey Sam, 2205 S. Wentworth Ave.

Mee Hong, 2125 S. Wentworth Ave.

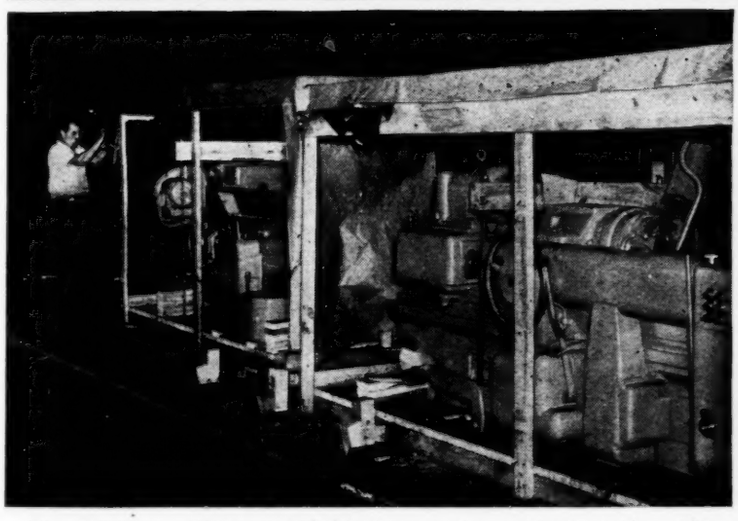
Tai Dong, 2206 S. Wentworth Ave.

Won Kow, 2237 S. Wentworth Ave.

Finally, if you want Chicago's best fresh fish—perch caught from Lake Michigan the same day—drive 18 miles, route 41, to the "Five Points" just beyond the Lever Bros. (Lux) plant in Hammond, Ind., and turn left to **Phil Smidt's.** All the perch you can eat for the dinner price. Also steak, chicken and frogs' legs. Ray Deen's (the author's Chicago compatriot on **A.M.—Ed.**) favorite place. He can and has eaten 20 perch for dinner.

You'll weigh more when you leave Chicago.

NEWS OF METALWORKING



One Corner of Huge Exhibit Space (top photo) of the Chicago-Dodge plant in Chicago where the 1947 Machine Tool Show will get under way Sept. 17. Trains bearing 16 million dollars in new machine tools arrive at the plant each day. Work of installing equipment from 294 exhibitors is under way. In the lower left hand photo, one of the exhibits is shown. Robert E. Ryan (left) and Saul Poliak, managers of the show, sponsored by the National Machine Tool Builders Association, are shown checking final details in the lower right hand photo

Grinding, Trucking Facilities Offered at Tool Show

CHICAGO—Exhibitors at the Machine Tool Show at the Dodge-Chicago plant Sept. 17-26 will be offered free grinding of single-point carbide tools and use of mechanized materials handling equipment.

Carboloy Co., Inc., will set up a modern tool-grinding department with necessary grinding equipment for all single-point tools and four trained operators. The installation will also serve as an educational demonstration of the proper method of grinding single-point carbide tools.

Each morning and night tools will be picked up and delivered to exhibitors' booths.

Automatic Transportation Co., Chicago, is providing a new electric fork truck and a fleet of motorized hand trucks to the convention management to be used for the convenience of exhibitors in unloading, setting up, servicing and re-shipping.

The fork truck, 4,000-lb. capacity, has been at work unloading materials since Aug. 1.

Gaging Business

Steel Buying Unabated

The steel industry indicates sheet and strip production will aggregate 18 million tons in 1947 without meeting demand. This is the tightest of all steel products where buying is unabated despite price advances.

While there is general agreement that resistance to higher prices is negligible at this time, some steel executives predict increased crystallization of price resistance right after the turn of the year.

Inventory positions mean much to processors and consumers of steel. They will purchase sparingly in respect to items which are in abnormal supply. Fourth-quarter allocation of steel will be no better than those in the third quarter.

Foundry Orders Improving

Foundry orders for new dies are improving. Many earlier estimates issued by foundries are resolving into orders from auto makers. Gray iron foundries expect to be limited to a 12-million ton output this year because of scarcity of pig iron, coke and scrap.

Gray iron founders are optimistic in viewing the future. Increased production of diesel engines is a heartening factor. Huge volumes of business are expected from the automotive field, building and construction industry, farm implement companies, and road building and earth moving firms.

Volume to Follow Show

Machine tool manufacturers are looking forward to volume orders this fall. The forthcoming Machine Tool Show is behind the anticipated upswing in fall orders. Despite normal summer business lull, manufacturers report operations continue at substantial levels.

Many prospective buyers will get cold production facts at the show. They will have productivity uppermost in their minds. When they have determined equipment that will best fill their needs, orders will follow.

Non-ferrous Metals Ease

The supply outlook for copper, lead, zinc and manganese has eased, and the end of the subsidy plan is expected to have no effect on prices. President Truman's veto of the subsidy plan has forced some mines in the Tri-State lead-zinc district to close, but this can be made up easily by increased imports.

Copper production for July showed a drop but this was expected. Imported and domestic refined copper shipments amounted to 109,817 tons in July, which is still a high figure against prewar consumption. Motor manufacturers find copper in better supply and it is virtually removed as a bottleneck in auto production.

Farm Equipment Market Strong

Farm implement manufacturers are being pressed to make dents in order backlogs. They are most conscious of the need for increased productivity and represent a strong market for production machinery.

Farmers are clamoring for implements which ease work loads and speed farming operations. The demand for tractors remains heavy. Tractor accessories and other machine items, such as balers, represent substantial markets and demand is expected to continue for some years to come.

Expansion Plans Pushed

Ambitious plans for plant expansion and new equipment are becoming realities for many companies. Outlays for new plant facilities and new equipment are expected to soar in the final quarter of this year.

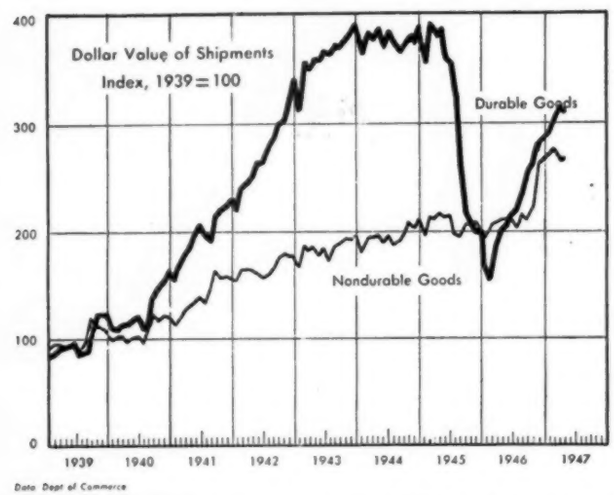
Construction costs have tended to delay fulfillment of many programs, but market demands are changing attitudes and green lights are being turned on.

Export Outlook Problematical

Despite conflict over dollar credits, exports continue at high volume. The export outlook, however, is beset by problems. Solutions must be found to Europe's economic problems before exports can reach any degree of stabilization. How long heavy foreign demands for American goods will continue remains a debatable issue.

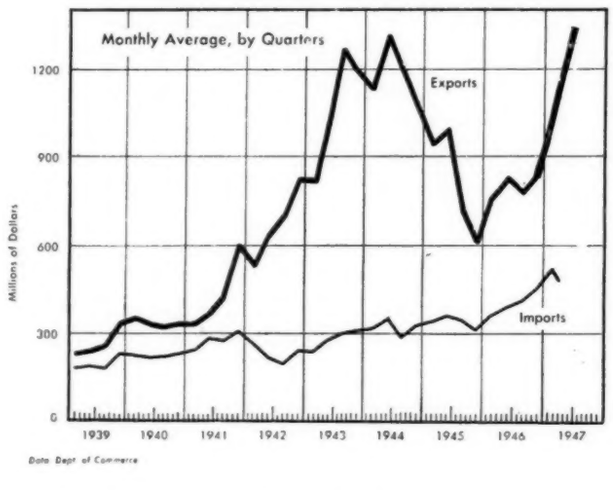
Manufacturers are becoming more aware of the importance of foreign markets. They are watching the State Department's actions in trying to straighten out the German industrial situation, an important economic cog.

FACTORY SHIPMENTS BOOM



Factory Shipments remain at unusually high peacetime levels. A slight tapering is noted during the summer months, but this was expected because of vacations, etc. Rising prices and expanding production have boosted the dollar rate of factory shipments. Shipments of durables are not much ahead of nondurables

FOREIGN TRADE HITS NEW POSTWAR HIGHS



Record Peacetime Foreign Trade has stimulated our postwar economy. Exports have shown a sharp rise since the first of the year. How long this favorable export situation will continue is debatable. Stiffer European competition is being encountered. Imports have dropped in recent months, but are expected to increase again

Services To Absorb Approximately One-Half of Machine Tool Surplus

WASHINGTON — Approximately one-half of the surplus machine tools now overhanging the market will be absorbed by JANMAT, the armed forces machine tool reserve committee.

This conclusion was drawn by the War Assets Administration in negotiations with JANMAT on a program which will soon be announced.

The new program is mainly an implementation of previous plans and progress on the military machine tool reserve, now legalized by the law Congress passed on the last day of sessions.

Thousands of reserve tools had already been tagged and many shipped to storage by JANMAT under a program which had been in development for months.

Inventory Improved

Not only the new law but the vastly improved accuracy of inventory now permits the definite drafting of JANMAT requirements, which total about 90,000 units. The program already includes the Air Forces as well as the Army and Navy and the passage of the Unification Act has made no material difference.

The latest WAA machine tool tally shows 121,936 items in stock, valued at 514 million dollars, based on cost figures. These in-stock figures are in line with previous estimates, but the estimates of declarations still to come are down to somewhere between 60,000 and 100,000.

The average of estimates on future declarations is 80,000. Added to the 121,936 shows a total surplus on hand and to come of 201,036. Thus JANMAT according to WAA estimates will take around half of the existing national tool surplus.

WAA will withhold from disposition all equipment tagged by JANMAT. It is understood, however, that the three services will "exercise restraint" regarding machines needed by industry, and refrain from tagging items already sold.

WAA will freeze tagged machines immediately on notification by one of the services and hold such items up to 45 days for shipping instructions.

Some items tagged by JANMAT in the past were sold later.

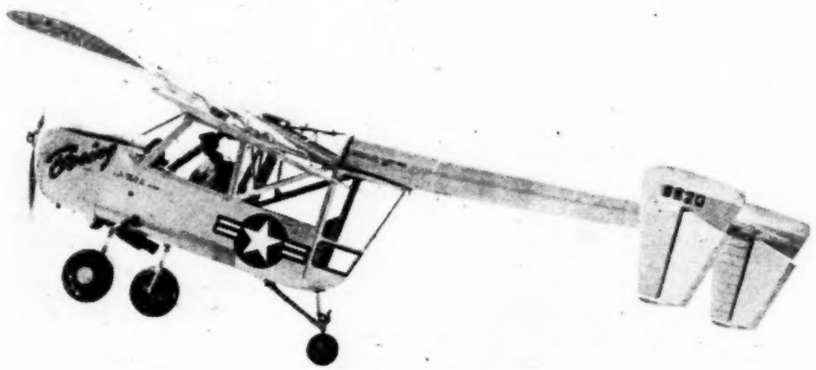
Costs of packing, handling and transportation will be charged to the service. No charge will be made on crates and skids already in place.

Ford to Concentrate Orders for Parts in Western Plants

LOS ANGELES — All parts going into Ford, Mercury or Lincoln cars and trucks manufactured on the Pacific coast will be developed, produced and purchased in the West under the Ford Motor Co.'s parts purchasing plan which will be completed within the next two years.

Last January, Ford expressed intentions of placing 60 million dollars of orders for parts in the West. The response from Western concerns was so great that Ford boosted the figure to 65 million. This is in addition to the 22 million now spent on the West coast for parts from Ford's established suppliers.

Prior to the war shops in this area showed little interest in Ford.



Designed for Quick Takeoff and Landing, the new Boeing XL-15 liaison airplane is now being tested in Wichita, Kans., where the plane is being manufactured for the Army Air Forces. This all-metal craft was designed for use by the Army Ground Forces on observation, communication and photographic missions

PRODUCTION AND MACHINE TOOL SHOW SET FOR AMPHITHEATRE

CHICAGO—Plans are nearing completion for the Production and Machine Tool Show to be held at the International Amphitheatre, 43rd and Halstead St., Sept. 17 to 26 inclusive.

Ralph E. Houseman, show co-manager, reports reservations are still being made at the show headquarters at Grafton, Wis. Most exhibits will feature machines in actual operation. Mr. Houseman said the latest in machine tools and accessories will be shown.

In response to *American Machinist's* request for a complete list of exhibitors, Mr. Houseman said the list "would not be made public at this time." He said a great number of companies have signed up, and negotiations are being made with an even greater number.

The show will be open from 10 A.M. to 9:30 P.M., daily except Sunday, Sept. 21. Admission will be by registration only.

Metal Plants Low On Benefit Plans

WASHINGTON—About 44% of the metal working plants in the United States provide insurance or pension plans for their employees, a Bureau of Labor Statistics study reveals.

The survey covered 6,647 metal working concerns out of a total of 15,636 plants in four manufacturing and seven non-manufacturing industries.

The national average showed 47% prevalence of insurance or pension plans in the eleven industries. Benefits touched 60% in textiles, 56% in chemicals and 56% in apparel, putting the metal working industry at the bottom.

Strike at Machinery Plant Ends as Owner Sells Out

CLEVELAND—With a strike on his hands, Ernest P. Moslo, president of the Moslo Machinery Co., solved the problem by discharging the 17 men involved and selling the equipment.

He told officials of the United Electrical Workers, CIO, that he would "sign no contract with the CIO."

"The union made no demands on me," Moslo said. "I didn't give them a chance. I don't even know if the men belonged to the union." The men struck late in July.

Labor Law Group Probes Ford Case

WASHINGTON — Two investigators for the joint Congressional committee watching the workings of the Taft-Hartley Labor Law are now in Detroit to get a thorough report on labor dealings at Ford Motor Co. and Murray Corp.

In both cases the United Automobile Workers, CIO, sought to make a test of its recently adopted policy of requiring all employers—where contracts are renewed or signed for the first time—to waive their right to sue the union for violation of contract.

The union struck Murray. At Ford, a last-minute compromise, which delayed the showdown for a year, averted a strike of 107,000 Ford employees. The Ford truce provides for no suits for not more than a year while a joint committee, with possible aid from the Ford empire, tries to work out a mutually acceptable solution.

Since the General Motors contract expires in May, it may have to make a decision before Ford.

Rep. Fred A. Hartley, Jr., of New Jersey, co-author of the law, had no objection to the Ford compromise but said he feared the consequences if it became a pattern.

Two AFL unions—Office Employees and Patternmakers — were the first to register with the U. S. Department of Labor in order to qualify under the Taft-Hartley law for recognition by the National Labor Relations Board.

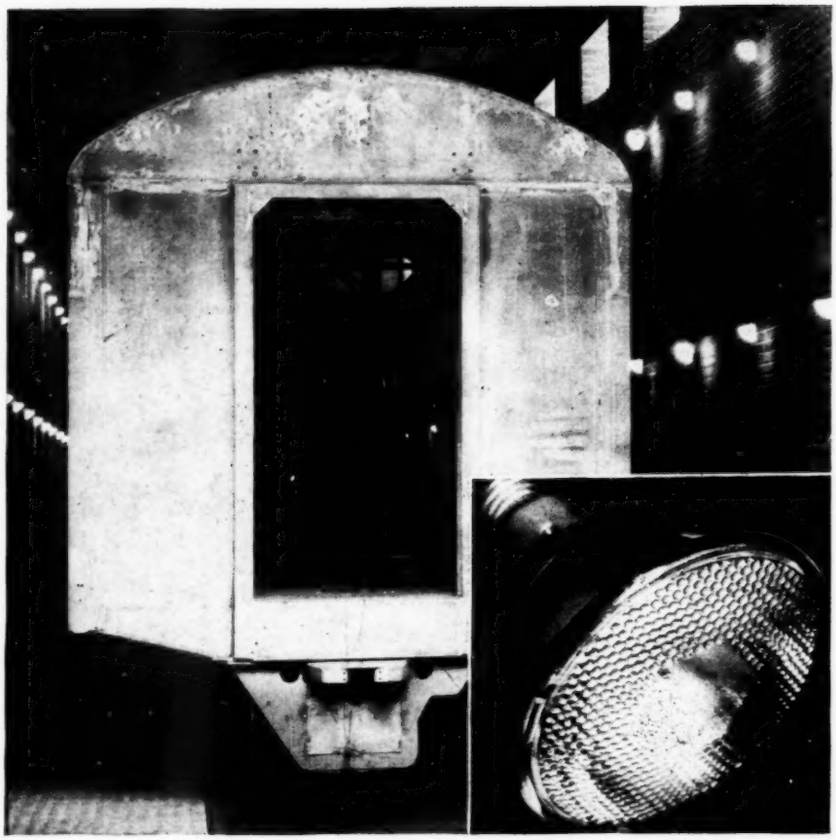
Another requirement is that local union officials and officials of labor organizations with which they are affiliated file affidavits declaring that they are not Communists and do not adhere to Communist beliefs. These are filed with the regional offices of NLRB.

Greater Productivity Urged To Raise Standard of Living

WASHINGTON — The labor committee of the National Planning Association has issued a statement, signed by 33 union leaders, urging increased productivity as a means of raising the standard of living.

It also stresses teamwork in overcoming restrictive practices of both management and labor. But, the committee states, it is up to management to take the leadership.

Another NPA committee is busy trying to get agreement between management and labor on what is a fair division of the benefits of increased productivity. It is headed by former OPA Director Leon Henderson.



Lighting of Shot-Blasting Rooms is simplified with General Electric Par-38, 150-watt flood lamp. At the Erie Works a car is shown in the chamber which is 87-feet long, with two rows of lamps down each side. The built-in reflector and heavy heat-resistant envelope protects the lamp. Insert shows lamp. In this installation wiring and load centers are outside the blast area. Sockets are supplied with 1/4-in. felt gaskets to keep shot out of shell

Steel Industry Fears Scrap Shortage

PITTSBURGH—Curtailment of steel production during the winter months is feared by the industry as a result of dwindling supplies of scrap metal.

Inventories reveal an average of but 20 to 30 days' supply of scrap metal on hand, whereas at the start of the fall season there should be at least 60 days' supply to provide against winter handicaps.

One top steel executive predicts there will be idle open hearth furnaces this winter due to this condition.

Scrap Prices at Peak

Even with scrap prices at the highest levels since World War I, there seems to be little hope of increasing the supply.

Meanwhile, resentment is growing in the steel industry against price increases of finished steel products which are above the increased cost of the metal.

As fabricators and processors pass along the $5 to $10 per ton advances of late July they cite boosts in materials and labor, but the impression is given to the public that steel has been responsible in the main.

This is an economic development which was unforseen by the steel industry at the time it was considering price increases.

Made "Whipping Boy"

However, there is a feeling of resentment that the steel companies should be made the "whipping boy" for all forms of price rises. This feeling does not extend to price rises by fabricators and processors where the percentage markup system is used, although this results in a larger increase per ton of steel to the ultimate consumers than was made at the mill level. In warehouse circles, some price upturns were made on the basis of previous percentage practices, while in others—and in a majority of steel products—the advance was the same as the mills.

Consumers are reporting that shortages of critical items still limit production and where these occur there are "stagnant" inventories. Some of these stagnant stocks now represent inventory profits.

Detroit

HEADACHES PLAGUE AUTO MANUFACTURERS . . . OUTPUT OF 5 MILLION CARS, TRUCKS DOUBTED THIS YEAR . . . PRICE ADVANCES GENERAL

Manufacturers Hampered

Price rises, shutdowns, shortages of parts due to supplier strikes and the Ford compromise with the Auto Workers led the automotive news during August.

And, as the month closed, manufacturers have practically written off any hopes of meeting the goal of 5 million cars and trucks during 1947. However, during the later part of August production moved upward after the shaky start.

Ford was in the spotlight as the company reversed its stand on the eve of a strike call and agreed with the union to waive for 12 months any recourse to the courts as permitted under the Taft-Hartley Labor Law. But, immediately after this announcement, Ford laid off some 51,000 workers as the results of shortages of parts from the struck Murray Corp. plants. Ford production was curtailed more than a week. Studebaker was closed for the same reason.

Rising Costs Cited

In a wave of price advances, General Motors Corp. started the ball rolling by advancing most of its passenger cars 2 to 6%. Most of the industry was not slow in following the lead.

G.M. bolstered its case with reports of cost increases since last November. Since then, the company said, steel has increased 17%, pig iron 29%, copper, 26%, tin 22%, lead 43%, cotton 23% and wool 12%. It was also reported that direct labor costs have risen 12% since last April as a result of the new agreement reached with the auto union.

Further Rises Seen

Further increases are anticipated by analysts who estimate rises of 2 or 3% on 1948 models.

These advances will be necessary, Detroit analysts believe, despite rosy profit showings of automobile companies in 1946 and thus far this year, because much recent production has been built out of inventories piled up earlier at lower costs. But present buying is at today's prices.

Efforts being made by auto manufacturers to maintain production in the face of steel shortages is shown by Hudson Motor Car Co.'s switch to low alloy, high tensile steel on a variety of body parts. Although this reduces tonnages as lighter gages are possible, it boosts the price.

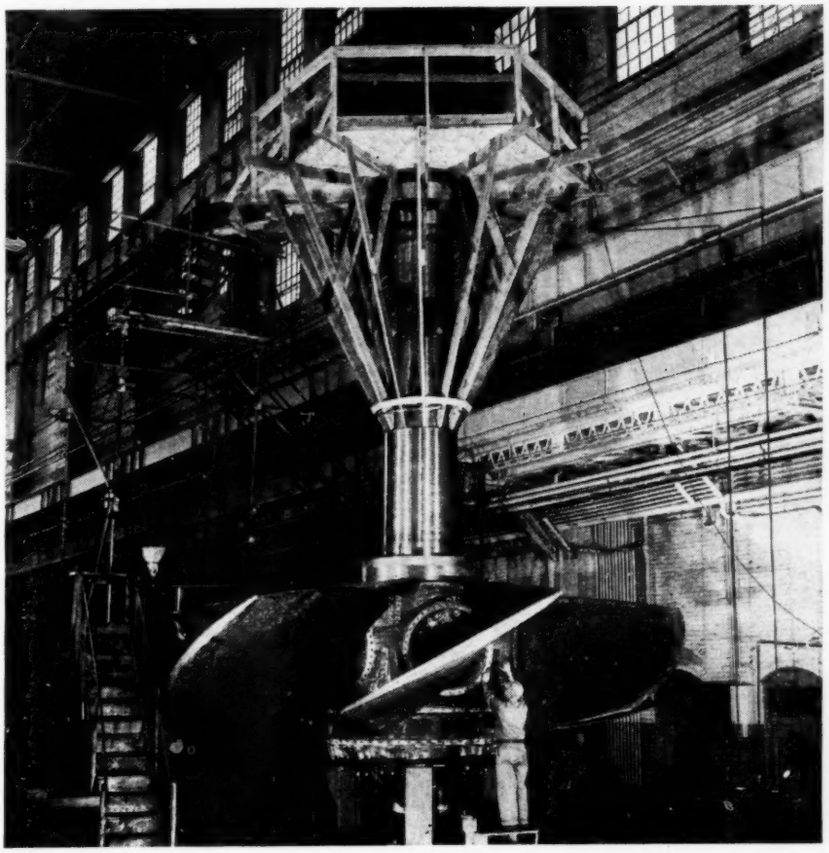
Hudson is using N-A-X steel for such parts as fenders, radiator grilles, dust shields and rear bumpers. Other companies are known to have used high tensile low alloy steel in production from time to time but have not used it on as regularized a basis as Hudson.

Willys-Overland Motors, Inc., mindful of wartime experience, is doing considerable manufacturing for others. The steel forge shop is now handling two and one-half million dollars in outside orders and are quoting on more. The plant's capacity has been increased by a 21 million-dollar modernization program which is nearing completion.

To Transfer Jobs

Willys is planning to transfer to the new body shop in Toledo stampings now being produced by the Hayes Mfg. Co., Grand Rapids. Hayes will continue to stamp and assemble Willys station wagon bodies. The jeep body will continue to be made by American-Central Co., Connersville, Ind.

The American Society of Body Engineers, recently organized, will hold its second annual convention in the Rackham Memorial Building, Detroit, Nov. 5-7. Technical sessions will include styling and production engineering the first day. The second day small cars, seating comfort and truck bodies will be covered at three sessions. Technical discussions on buses and coaches, body construction materials, and passenger car and body engineering will wind up the meetings.



Huge Adjustable Blade Kaplan Runner and shaft assembly for the 5th unit of TVA's Kentucky Dam was recently completed in the Allis-Chalmers Mfg. Co. shop. The runner is nearly 22 feet in diameter with its main shaft extending nearly 26 feet above. Turbine rating is 44,000 hp. under operating head of 48 feet

British Industries Fair

LONDON—The 1948 British Industries Fair will open in London and Birmingham May 3 and close on the 14th.

Washington

LOAN REDUCTION FOR KAISER DOUBTED ... AIR FORCES PLAN INDUSTRIAL ASSOCIATION ... UNION REVERSES STEEL STAND

RFC Move No Surprise

RFC's rejection of the request of Henry Kaiser to write off about 85 million dollars of the 105-million loan which paid for the wartime building of his Fontana steel plant came as no surprise.

The RFC officials have felt all along that they had no right to make any concessions beyond those made two years ago. At that time, they waived interest on around 35 million dollars and made amortization of this portion contingent on profits.

Kaiser's only real hope of reducing the indebtedness of Fontana rests with Congress. The steel committee of the Western States Council—a Coast business group—began pressing the Kaiser case on Congress late in the last session. It will make a strong fight when Congress reconvenes next year. But Kaiser is tagged as a New Dealer in most Republican eyes, and he is not likely to get a very sympathetic hearing from the present Congress.

Industrial Unit Planned

The U. S. Air Forces is working on an industrial association, modelled along the lines of the Army Ordnance Association and Navy Industrial Association. The new organization shows promise because the USAF is already bigger than the Navy.

Marshall Plan Eyed

Dozens of federal agencies are eyeing Secretary Marshall's rehabilitation plan for Europe as something to get into—to say nothing of the U. S. producers interested in selling their products.

Helicopters Limited

The Air Forces new XR-12 Bell Aircraft all-purpose helicopter is another step in the quiet but steady progress of rotary aircraft toward eventual importance in military, transport, personal and special industrial flying. A previously restricted report by the Air Force and U. S. Forest Service, however, shows in detail the disappointing failure of helicopters to land and take off with appreciable loads even at elevations of 4,000 to 5,000 feet. All previous tests had been made at sea level. It is clear that altitude performances will have to be improved.

Union Reverses Stand

Reversing their previous stand, the United Steel Workers, CIO, have told the Senate Small Business Committee that steel capacity should be increased. Management contends that present capacity is adequate for long-term needs. Previously, the Steel Workers argued that expansion, bringing in new workers, would undercut job security in leaner times. Now they have decided to bet on full employment.

Littlejohn Unscratched

WAA Administrator Robert M. Littlejohn came through the House Surplus Property Committee's attack on his disposal operations. The keeper of the nation's big second-hand store now has firmed up his inventories and put on so much sales pressure that the Republicans think he is too solid to tackle again.

Tucker Issue In Doubt

Brokers in Washington watching the Tucker stock issue believe that the sale is stymied while the securities are quoted at $4.50 to $4.75 in the market, against the issuance price of $5 per share. The statement by Floyd D. Cerf, underwriting the offering, that 75 to 80 per cent of sales necessary to meet working capital requirements have been made, does not mean that 75% of the required $15 million because the requirement includes company cash on hand.

Surplus Engines Utilized

The University of Illinois has converted army surplus aircraft engines into compressors to deliver 28 pounds of air per second at 140 pounds per square inch. The tunnel is testing propellers to operate continuously at supersonic tip speed, regardless of airplane speed. If successful the use of propellers might be importantly extended in competition with jet power.

New Procurement Law?

A new law governing wartime procurement may be the non-political end product of the Senate War Investigating Committee's probe of Howard Hughes' airplane contracts.

Committee Chairman Brewster and Sen. Ferguson report they are planning to foster such a bill, after a thorough check of how present laws on procurement and contract renegotiation and settlement worked out in World War II. Both claim there were many failings in the present law and that too many short-cuts were taken to gain speed.

They also feel that the letting of contracts should be separated from contract renegotiation.

Thirteen Hundred of These S-4 self-propelled combines are expected to be produced this year in five Russian plants. Each combine is reported capable of handling more than five acres per hour, consuming about 50% of the fuel required by trailer combines. This combine is handled by one man. Driven by a truck-type motor, the cutting of this unit is placed in front, which facilitates selective mowing and harvesting

Wichita City Library

Japan Visualizes Prosperous Machine Tool Industry

(McGraw Hill World News)

TOKYO—Japan's machine tool industry—despite the sword of reparations hanging over its head—faces a potentially prosperous future.

With a record of a 70-fold increase in production from 1931 to 1943 behind them, the reasons for the machine tool builders' optimism are:

1. At maximum, reparations will take away only one-half of production facilities, leaving sufficient equipment to turn out 27,000 units per year.

2. Anticipated demand of other industries for machine tools when, and if, rehabilitation gets into full swing.

3. The potential market in the rest of East Asia, which can pay for equipment with sorely needed raw materials.

4. Machines, including gear cutters, grinders, milling machines and automatics, formerly imported, can now be manufactured in Japan as a result of war-forced technical advancements in quality and variety.

Present Situation Dark

The optimistic side is darkened at the present by small volume of orders, shortages of materials, transportation and bank credit as well as the reparations threat. However, from a long-range view the clouds over the industry will be swept away.

The Machine Tool Makers Association believe they can manufacture most of the machines needed, thereby reducing imports to a far lower mark than before the war. They would like some new models to copy, but in the future this can only be done on a license basis with royalties payable to the patent owner.

In substantiation of the quality claims of the association, along with the increase in variety of tools, comparative tests by the Ministry of Commerce and Industry and the aircraft companies indicate the quality index of Japanese-made tools was 95, with 1935-38 models of U. S. and German tools equalling 100. In 1937 the index was only 55.

Asiatic Bloc Probable

Machine tool manufacturers hope to become the suppliers of Asia. Left with a capacity to produce 27,000 units per year, they could turn out up to 15,000 units for export. Demand for simple production tools by China and other countries lacking well-developed skills is one point in their favor.

An even more important factor will be the ability of Asiatic countries to pay for these tools with essential materials. As a result, an Asiatic trade bloc is almost a certainty.

Probably it will take at least three years before this will take a definite shape.

No real recovery of Japanese industry can come until the question of reparations is settled once and for all. Although the Supreme Commander for the Allied Powers (SCAP) has listed 90 machine tool plants for reparations, the list is tentative. As a result, no machine tool builder can be sure of the final status of his plant. Therefore, banks refuse to grant loans, and plants on the designated lists are banned from the credit transactions. At the same time bankers refuse loans to others who are not able to guarantee their plants will not be seized.

Order Held Back

Other industries face even more drastic reparations and refuse to place orders for machine tools under expansion and rehabilitation programs until this ghost is laid.

Japanese manufacturers beg for a settlement of this reparations questions and army officers counter SCAP civilian officers' requests for a green light guarantee to a limited number of concerns with:

"An army of occupation cannot make promises, it can only issue orders."

A new mission under Clifford S. Strike of F. H. McGraw Co. is on its way to Japan. It is expected to propose a reparations program far less severe than any previously made. Every member has been carefully selected by Strike to insure complete sympathy for General MacArthur's desire to retain the maximum productive plant in Japan. The general carefully outlined this to Strike at the conclusion of the first Strike survey in February.

The whole situation has come to the point where SCAP can no longer shirk responsibility on the question.

Members of the Japanese Machine Tool Makers Association believe that removal of even 50% of their capacity would leave more than enough facilities for Japan's needs.

2,346 Units Produced

In the first five months of this year they turned out 2,346 units with an average weight of 0.726 tons. This is the lowest per unit weight in the last 20 years.

Most recent orders have been for light tools: Bench drills, boring machines, bench millers and grinders. Most buyers will make only the smallest possible investment in equipment which can turn out trinkets and consumer goods which can be sold at high prices.

Of the 3,074 units currently on back order, more than 1,600 are for bench drilling and boring machines and 555 for light grinders. Stocks inventories will cover almost all of the remaining orders, but the shortage of rail transportation has held up deliveries. Machine tool builders say a bribe is necessary to

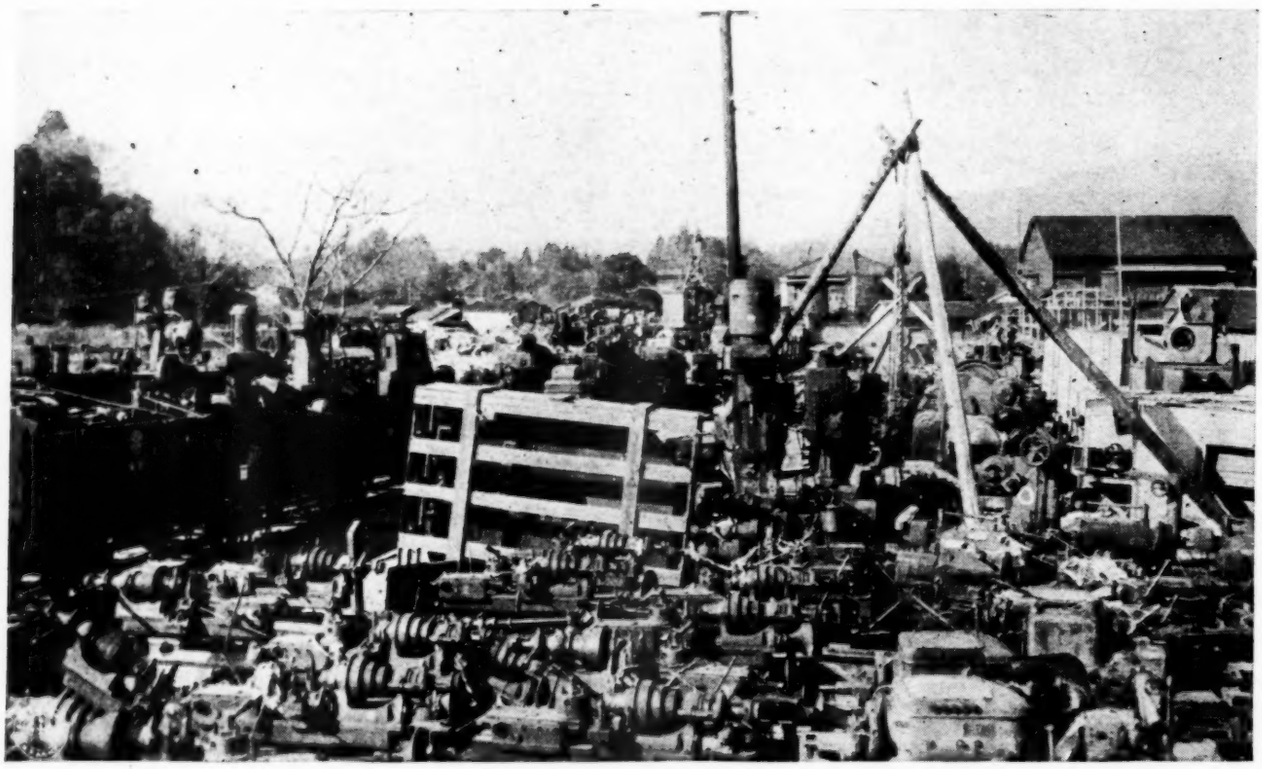
JAPANESE MACHINE TOOL IMPORTS

Year	Units	Value ($1,000)
1931	300	3,070
1932	450	5,810
1933	1,140	11,339
1934	1,602	14,485
1935	1,205	9,998
1936	3,101	15,385
1937	6,116	40,968
1938	7,128	91,738
1939	7,635	157,166
1940	3,134	78,500
1941	1,500	26,140
1942	550	9,230
1943	450	8,040
1944	200	3,990

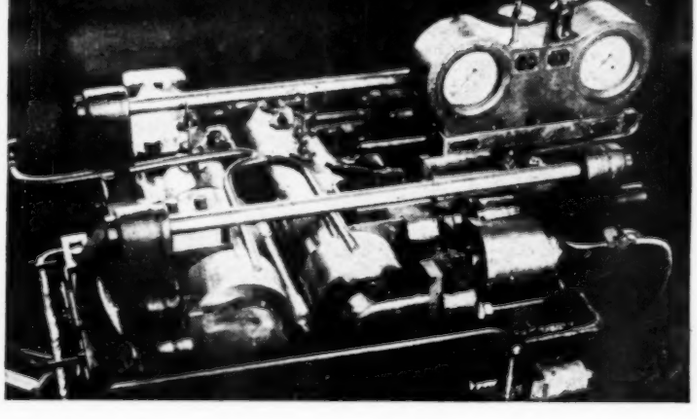
JAPANESE MACHINE TOOL PRODUCTION 1931-47

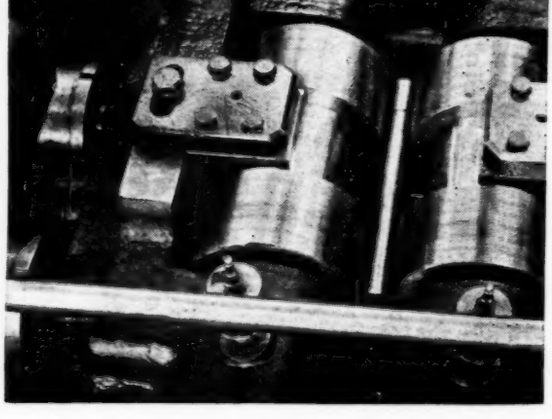
Year	Units	Weight (Tons)	Unit Weight (Tons)	Value ($1,000)	Employees
1931	2,100	2,310	1.10	3,940	1,920
1932	3,000	3,817	1.28	8,200	4,090
1933	5,618	7,523	1.36	10,615	5,250
1934	7,747	11,165	1.45	16,547	8,330
1935	10,054	15,400	1.52	18,751	9,440
1936	16,227	25,960	1.60	30,668	15,500
1937	21,888	35,695	1.54	50,199	27,215
1938	67,260	110,880	1.65	204,085	63,670
1939	66,830	112,464	1.68	274,597	76,041
1940	58,088	111,870	1.93	312,979	74,361
1941	46,058	113,410	2.46	318,167	80,466
1942	50,088	125,440	2.50	427,623	90,948
1943	60,134	154,828	2.57	602,913	126,719
1944	53,844	141,601	2.63	723,378	103,765
1945	7,316	12,991	1.78	108,874	82,950
1946	4,791	4,708	9.79	105,751	10,060
1947*	2,346	1,714	0.73	63,400	6,764

*Period of Jan. 1 through May 31.



Removed from Japanese Underground Factory these machine tools (above) will eventually go as reparations to impoverished Far Eastern countries. Few are in A-1 condition but will help tremendously. Assembly line in the Abiko plant, Hitachi Seiki Co., Ltd., holds many gear grinders (right). Before the war most gear grinders were imported. Two other Hitachi plants in the Tokyo area have been designated for reparations. The Abiko plant, although not on list, is operating at less than 40% capacity. This thread roller (lower left) is manufactured by the Hitachi company. A stay bolt for a locomotive is being cut. Lower right is a closeup of the dies and bolt. It is with machines such as this that the Japanese hope to compete with foreign makes





get any transportation at all.

Making New Items

The association has 174 member companies of which only 58 are now making machine tools. Many admit that they are forced to manufacture other items to keep plants open and employees paid. The other members are working exclusively on printing machinery, pumps, farm equipment, auto parts, looms, flour mills, bicycles, compressors, nail machines, refrigerators, hoists, sewing machines, gasoline engines, springs and locomotives.

These items are more profitable and the government's Economic Stabilization Board allocates much more raw material for production of these products than for machine tools. In the three-month period of March, April and May only 7% of allocated materials to machine tool plants was designated for machine tool production.

Balance Sheet

The raw material balance sheet for this period for machine tools was:

Material	Allotment (Tons)	Consumption (Tons)
Cast Iron	424.6	806.19
Copper	40.7	50.82
Steel	287.32	477.07
Coke	133.65	304.15
Coal	191.4	184.8
Pig Iron	123.75	728.53

Part of the balance is made up from stocks on hand, part from purchases in black market. Some builders believe that they have enough stocks on hand to last for three to five months at the present rate of production. Others are not as fortunate and must buy outside where prices are exceedingly high.

Recently, a 620-ton cache of silicon steel sheets was unearthed at the Osaka arsenal. The former assistant manager of this reparations-designated plant buried this treasure in late 1945, hoping to dig it up and make a fortune some day. Military government teams are coming across similar booty every day.

Coal Mining Off

Manufacturers frankly admit they can get materials if they must have it. However, the coal and coke shortage is the most serious problem. Japan has little indigenous coking coal. Formerly it depended on supplies from North China. Hardly any trickles out of that war-infested area now.

Hopes to mine 30 million tons of coal this year, were shattered as the monthly output so far has been about 400,000 tons short, a 16% lag, but increased production is predicted.

India Puts Sharp Curbs on Imports

NEW DELHI, India (McGraw-Hill World News)—The drastic cutting off of imports in a move to block inflation and conserve foreign currency resources will not affect imports into India of machine tools and metal working equipment.

However, producers of finished metal goods will find a solid wall staring them in the face.

Leading the list of virtually banned items are all types of motor vehicles, whether imported complete or as chassis. Others on the list include:

Firearms and components, wire, cable, perforated steel sheets, nonferrous pipe fittings, wire netting, twist drills, reamers (of types made in India), garden tools, tin or galvanized buckets, cutlery, metal furniture, refrigerators, radios, phonographs, musical instruments and most domestic hardware.

The spending by India of 300 million dollars yearly for food has given India an unfavorable trade balance. This curtailment of imports will tend to force what balances there are into purchases of capital goods, so machine tools may be purchased.

Swedish Concern to Build Inexpensive "People's Car"

STOCKHOLM—A "People's Car," with front-wheel drive and streamlined body, will go into production at the Swedish Aircraft Co. in Linkoping in 1949.

Tests on this 25-horsepower, 1,550-pound automobile showed a maximum speed of 60 miles per hour. The car is expected to retail for around $1,400.

BRAZILIAN CONCERN STARTS ASSEMBLY OF AUTOS

RIO DE JANEIRO (McGraw-Hill World News)—The Companhia Distribuidors Geral Brasmotor has started to occupy an assembly plant at Sao Bernardo do Campo, State of Sao Paulo, which will occupy 26,000 square meters when completed. It is to cost about $800,000. Around 10,000 square meters are now ready, the announcement says.

They already are starting to assemble Dodge, Fargo and de Soto trucks, and will eventually assemble also Chrysler passenger cars as well as products of the Philco Corporation, the statement says.

The plant is outside the center of Sao Paulo city. When completed, it is to employ about 700.

India Moves to Protect Grinding Wheel Industry

NEW DELHI, India (McGraw-Hill World News)—Rigorous protection of the infant Indian grinding wheel industry has been decided on by the Indian government on recommendation of the Tariff Board.

Import of any type of wheel manufactured by the two existing Indian manufacturing concerns has been banned through mid-1948, and import of types not currently made in this country may be imported only on payment of a 50% duty. Import of synthetic abrasive grains will be allowed duty-free and government agencies will be instructed to place orders exclusively at home.

ILO Metal Trades Session on Sept. 2

STOCKHOLM (McGraw-Hill World News)—The Metal Trades Committee, one of seven international committees set up by the governing body of the International Labor Office to deal with conditions in major industries, will meet in the Parliament Building here Sept. 2.

The Iron and Steel Committee met August 20.

Each of the seven committees (which cover inland transport, textiles, coal mining, iron and steel production, the metal trades, petroleum production and refining, and building, civil engineering and public works) is of a tripartite character, consisting of representatives of the governments, employers and workers of the countries most directly concerned with the respective industries. The general terms of reference of each committee are to consider the present social problems of its industry and future international cooperation on social policy and its economic foundation in the industry. The committees have authority to recommend action on the part of the employers' and workers' organizations concerned in the various countries, as well as to recommend action by the I.L.O.

The Metal Trades Committee will receive reports on developments since the last meeting, and will also consider the following questions:

1. Regularization of production and employment at a high level;
2. Minimum income security (annual and other wage systems designed to provide assured earnings); and
3. Labor - management co - operation.

Railroad Orders For Tools Seen

CLEVELAND—Dealers and manufacturers of machine tools anticipate a heavy demand from the railroads for machinery in the near future.

At least two railroads have queried dealers in this area for prices and delivery dates on a long list of machine tools. One of the carriers indicated to dealers that their engineers expected to canvass the Machine Tool Show in Chicago and perhaps change some of their specifications.

In addition to the activity of the two trunk line railroads, the placing of firm orders by one of the steel companies was cause for some jubilation in an otherwise generally dull period in this territory.

Price does not appear to have played any part in the recent slackening of orders. In fact, scarcely a ripple of comment was heard following the 10% increase made effective by some machine tool builders on parts of their lines in July. The fact that the price of machine tools is not being challenged or questioned by potential customers is an encouraging omen to the majority of the builders and dealers in the Cleveland area.

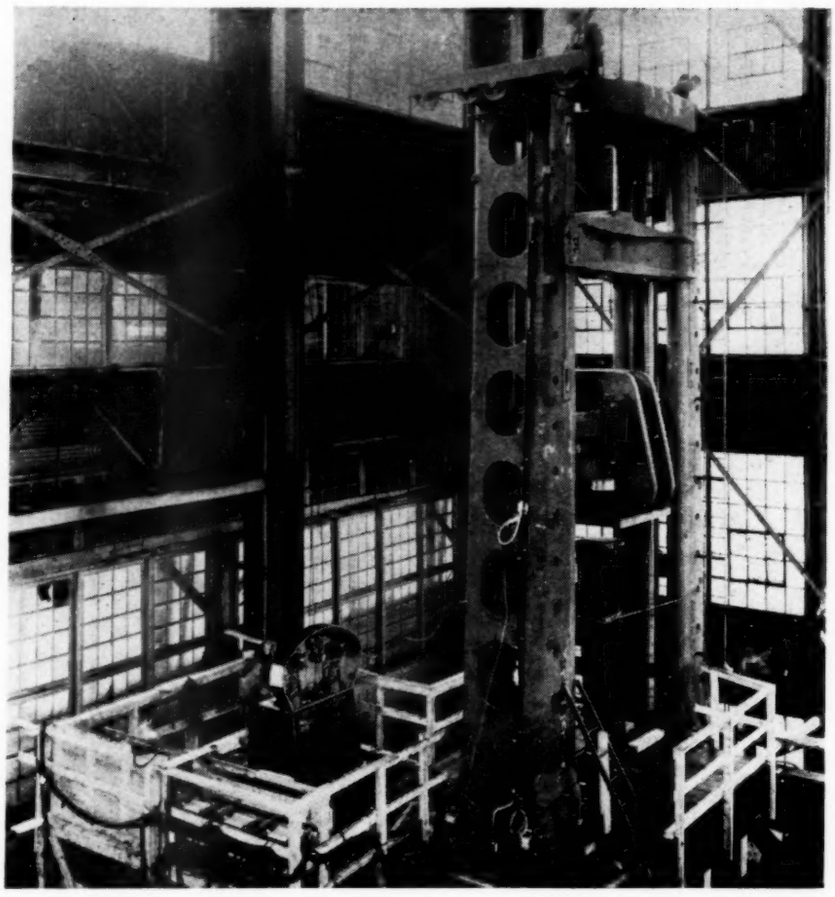
Scrap Shortage Laid to Capital

SAN FRANCISCO—West Coast steel men are prodding Washington in an effort to "accelerate" the sale of large stocks of surplus scrap in the area, contending that present methods of disposal are "wholly inadequate and unsatisfactory."

A steel and machinery group conducted a July survey that located some 350,000 tons of surplus scrap available at only a few Northern California depots and plants. Since the West Coast industry's needs are about 1,800,000 tons annually, that 350,000 tons—a better than two months' supply—could ease the present crisis in scrap appreciably.

During the first week in August concern in the industry sharpened with the rise in price of heavy melting scrap on the coast from $19 to $22 per ton.

The San Francisco group made its survey in conjunction with regional WAA authorities for a report to the National Steel, Foundry & Scrap Industries Committee. The report was signed by H. W. Christensen of Columbia Steel, chairman of the California subcommittee. Other members of the group represented Bethlehem Pacific Coast Steel Corp., California Metals Co., Enterprise Engine & Foundry Co., and Moore Machinery Co.



Two-Million-Pound Testing Machine for tension and compression work is nearing completion. The unit will take specimens up to 10 feet wide, 20 feet high and, for transverse testing, 80 feet long. New structural designs in the University of Washington equipment afford maximum rigidity and minimum deflection. The machine was built by Baldwin Locomotive Works, Philadelphia

First Inclinable Hydraulic Press Offered to Stamping Trade By HPM

MOUNT, GILEAD, Ohio—Increased consumption of stampings, injection-molded thermo-plastics and die castings is predicted by Col. H. A. Toulmin, president of the Hydraulic Press Mfg. Co.

Machines designed for present and future needs and more aggressive engineering of new products will help this coming expansion, Col. Toulmin pointed out.

As its part of the program, H.P.M. exhibited to the press and its dealers a line of machines designed to fill needs foreseen through careful field studies. The designs stress higher output and reduced maintenance costs.

Fundamentally new in the line is the 50-ton Economy Press. Col. Toulmin states that this is the first inclinable hydraulic press offered to the stamping trade. Freedom from maintenance expense and damage when more than one blank is loaded into the die is featured in this machine. Power is applied smoothly at more than 100 strokes per minute for forming, embossing, shallow drawing, blanking, assembly and other operations. This unit is expected to handle parts which crack or rupture under impact.

The use of a hydraulic booster produces more compact machines and cuts the motor size 50%.

Shortages and high price of steel has forced manufacturers, where possible, to turn to zinc and aluminum for diecasting. Therefore, to reach these people H.P.M. is introducing two 150-ton machines—one for aluminum and one for zinc, lead and tin. These machines make up to 400 shots per hour. Also introduced is a 400-ton machine for producing zinc diecastings by the submerged plunger injection system.

In the injection molding field, H.P.M. is bringing out a 32-ounce injection molding machine for this class of work.

Farm Equipment Output Mounting

CHICAGO—There are no signs of slackening demand upon the Chicago area farm equipment industries. Plants making machines for farmers are producing far more than they did a year ago, when large segments of the industry were beset with strikes. Today's output is about 85% of capacity for the industry generally.

Only in a few small items—such as cream separators and other dairy equipment—is supply approaching demand. Demand seems even greater for tractors, combines, corn pickers, and automatic pickup haybalers.

Last year, 252,000 tractors were made, and the rate this year far exceeds that of 1946—nevertheless waiting lists are long.

Industry spokesmen say entry of Dearborn Motors into the farm equipment field will hurry the time when supply and demand are in balance, but this is still many months off.

New products, developed since the war, such as mechanical cotton pickers and self-propelled combines, are swelling demand. New pickup haybalers are especially popular. They eliminate burdensome hand work.

International Harvester, largest in the farm machinery field, evidently thinks the market for its products will be on a higher level permanently.

In the Chicago area alone, Harvester is spending $37½ million on expansion, out of a nationwide $145-million program. In addition to buying the Melrose Park Buick aviation engine plant, Harvester has spent $12½ million on new equipment and remodeling. The plant is making diesel engines and large tractors. Other war plant in this area have been bought by Harvester, and tooling expenditures have been large.

Instrument Society to Conduct Meeting and Exhibit Sept. 8-12

PITTSBURGH—The second annual conference and exhibit of the Instrument Society of America will be held at the Stevens Hotel, Chicago, Sept. 8-12.

Among exhibitors will be Aeroquip Corp.; Aircraft-Marine Products Co., Inc.; R. B. Annis Co.; The Bristol Co.; Brown Instrument Co.; The Brush Development Co.; Carson Micrometer Corp.; Engis Equipment Co.; The Foxboro Co.; The Gaertner Scientific Corp.; General Electric Co.; Leeds and Northrup Co.; Linde Air Products Co.; Miniature Precision Bearing Co.; Physicists Research Co.; South Bend Lathe Works; Veeder Root, Inc.; John Worley Jewel Co.

Names in the News

R. A. Smith

A. Marchev

Reginald A. Smith has been appointed sales manager of the De-Vlieg Machine Co., Ferndale, Mich.

Alfred Marchev, former president and chairman of the board of Republic Aviation Corp., has been elected to the board of directors of Aircraft Screw Products Co., Long Island City, N. Y. Mr. Marchev is also president of Gordos Corp., and a director of General Precision Equipment Corp.

Hermann G. Place has been elected president of General Precision Equipment Corp. He succeeds **Earle G. Hines** who is the new chairman of the board.

Randolph W. Hyde, Carnegie-Illinois Steel Corp., has been elected treasurer.

Lester R. Edwards, president of Northeastern Container Corp., has been named director of Erie Railroad to succeed **John W. Stedman,** who has become chairman of the executive committee of the St. Louis-San Francisco Railway.

M. D. Wald has been appointed assistant district manager of Cleveland district steel plants of the Republic Steel Corp.

Frederick H. Eaton has been named assistant vice president of American Car & Foundry Export Co.

R. L. Puette has assumed the post of vice president in charge of production of the Clark Controller Co., Cleveland, Ohio.

Col. Frank H. Higgins has been elected vice president of Hupp Corp. and will be in charge of Detroit operations.

William C. Krecklow, who started with Allis-Chalmers in 1910 as office boy, has been named production control manager of the company's West Allis general machinery works.

Benjamin B. Cravens, Cranston, R. I., has been named vice president of the Franklin Machine Co., East Providence.

Herbert J. Noble, vice president and treasurer of the Taylor Instrument Companies, Rochester, N. Y., has been elected executive vice president and assistant general manager.

E. B. Brant, Page Steel & Wire, division of American Chain & Cable Co., has been appointed district sales manager. He succeeds **Fred H. Jones,** who has retired because of ill health.

David W. Hopkins, consulting engineer, has been promoted to executive vice president in charge of the valve, furnace and manufacturing divisions of the R-S Products Corp., Philadelphia.

C. W. LaPierre

H. L. Newell

C. W. LaPierre, formerly manager of General Electric's electro-mechanical division, has been named vice president in charge of engineering of American Machine & Foundry Co. **H. L. Newell,** former president of Waring Products Corp., has joined the company as manager of its central engineering department.

E. B. Cleborne, vice president and director, has been named executive vice president of the Allegheny Ludlum Steel Corp.

Albert F. Faber, has been appointed director of plant operations at the Glauber Brass Mfg. Co., Kinsman, Ohio.

J. K. Sutherland has been named sales manager of the Beechmaster Mfg. Co., Los Angeles, Calif.

L. R. Garretson, advertising manager of Leeds & Northrup Co. since 1925, has retired due to ill health.

William B. Huston has been appointed sales manager of Unimax Switch Corp., New York.

C. W. Harrold, chief engineer for a division of the Harris-Seybold Co., has been named vice president in charge of engineering and development.

Adolph W. Engstrom has been appointed executive vice president and general manager of Western Metalcraft, Inc., Olympia, Wash.

OBITUARIES

Henry Morrison Reed, 66, chairman of the board of the American Radiator & Standard Sanitary Corp., manufacturers of heating equipment and plumbing fixtures, died Aug. 12 in Allegheny General Hospital.

Thomas Scott Clingan, 71, retired vice president of the Bethlehem Steel Co., Redwood City, Calif., died July 28 in Seattle, Wash.

Safford K. Colby, 74, vice president in charge of research, sales promotion and advertising for the Aluminum Co. of America, died Aug. 4 in Pittsburgh. He started the Pittsburgh Reduction Co., which became ALCOA, in 1894.

Henry D. Ogden, 88, former vice president of J. M. Quimby & Co., died Aug. 3 in Port Chester, N. Y., while on a visit. His home was in Pinehurst, N. C., for the past two years.

Thomas E. O'Neill died Aug. 5 in Huntington, W. Va. He was owner of the Thomas O'Neill Machine Shop which built the first working model of the multigraph machine.

Frank H. Russell, former president of Manufacturers Aircraft Association, Inc., and former vice president of the Budd Co., died Aug. 3 in Newtown, Pa. At one time he was vice president and director of the Curtiss Aeroplane and Motor Co.

John Edward Wit, 75, president of Atlas Bolt & Screw Co., Cleveland, died Aug. 1 at his home in Willoughby. He was also a director.

Winfield S. Adams, 50, Buffalo representative of Manning, Maxwell & Moore, Inc., recognized authority on valves and gauges, died Aug. 1.

Paul W. Gabaelein, 60, vice president and operating manager of Chrysler Motors of California, died in Pasadena, Aug. 6.

James M. McGill, plant superintendent of Kennedy Valve Mfg. Co., Elmira, N. Y., died recently following a brief illness.

Henry DuMars, retired head of the engineering department of the Erie Forge & Steel Co., Erie, Pa., died at his summer home recently.

Howard H. Beatty, executive assistant to the head of Aluminum Co. of America's fabricating division, died Aug. 4 in New Kensington, Pa.

William E. Jones, 81, retired president of the old Ohio Tool Co., died Aug. 6 in Columbus, Ohio.

W. B. Campbell, 65, former president of Ford Motor Co. of Canada and chairman of the board of directors since April, 1946, died in Windsor, Ont., Aug. 10. Mr. Campbell rose from the company's first bookkeeper to presidency in 1929 during his 42 years with the concern.

Frederic W. Willard, 66, former president of the Nassau Smelting & Refining Co., Staten Island, N. Y., died Aug. 11 at his home in Summit, N. J. A metallurgist and chemical engineer, he had been with the Bell System 41 years. He retired in April, 1947.

MEETINGS

American Gear Manufacturers Association. Fall meeting. Edgewater Beach Hotel, Chicago. Oct. 27-29. Newbold C. Goin, executive secretary, Empire Bldg., Pittsburgh 22.

American Society for Metals. National Metal Congress & Exposition. International Amphitheatre, Chicago. Oct. 18-24. Graves Taylor, 7301 Euclid Ave., Cleveland 3.

American Society of Mechanical Engineers. Fall meeting. Hotel Utah, Salt Lake City, Utah. Sept. 1-4. Ernest Hartford, executive assistant secretary, 29 W. 39 St., New York.

American Welding Society. Annual meeting. Hotel Sherman, Chicago. Oct. 19-24. M. M. Kelly, secretary, 33 W. 39 St., New York.

Instrument Society of America. Annual conference and exhibit. Hotel Stevens, Chicago. Sept. 8-12. National office, 1117 Wolfendale St., Pittsburgh.

Machine Tool Congress. Evening meetings in conjunction with the 1947 Machine Tool Show of the National Machine Tool Builders' Association:

American Foundrymen's Association. Sept. 19.

American Machine Tool Distributors Association. Hotel LaSalle. Sept. 17.

American Society of Mechanical Engineers. Hotel Continental. Sept. 18 and 24.

American Society of Tool Engineers. Sept. 19.

Chicago Technical Societies Council. Sept. 23.

National Electrical Manufacturers Association. Palmer House. Sept. 22.

Society of Automotive Engineers. Hotel Knickerbocker. Sept. 25.

National Machine Tool Builders Association. Machine Tool Show. Dodge-Chicago plant, Chicago. Sept. 17-26. Tell Berna, general manager, 10525 Carnegie Ave., Cleveland.

Society of Automotive Engineers. Tractor meeting. Hotel Schroeder, Milwaukee. Sept. 17-18. John A. C. Warner, executive secretary and general manager, 29 W. 39 St., New York 18.

American Society of Body Engineers. Annual convention. Rackham Memorial Building, Detroit, Nov. 5-7.

Society for Experimental Stress Analysis. Annual meeting. Hotel Pennsylvania, New York, Dec. 4-6.

American Society of Tool Engineers. Semi-annual convention. Statler Hotel, Boston, Oct. 30-Nov. 1.

BUSINESS ITEMS

Progressive Welder Co., Detroit, has acquired the **Warren Alloy & Machine Co.,** Warren and Detroit, which has been operating a nonferrous foundry in Warren and a jig, fixture, die, gage and punching plant in Detroit.

The Bingham Stamping Co., Toledo, Ohio, has called a meeting of the stockholders to vote on a resolution to change the company's name to **The Bingham-Herbrand Corp.** Operations, however, will be carried on as a separate division.

Sommer & Adams, builders of special machine tools, has been moved to Warren, Ohio. The company was sold to **Federal Machine & Welder Co.,** Warren, about a year ago. The Cleveland plant will be sold as well as some of the machinery.

Veeder-Root, Inc., Hartford, Conn., will move its Bristol, Conn., plant into a new building in Hartford as soon as it is built. About 500 employees in Bristol will be offered work in the new plant. Reduction in costs were given as the reason for the move by Pres. John H. Chaplin.

The **Deere-Lindeman Co.** has been granted permission by the Yakima, Wash., building inspector to construct a $50,000 forge shop at its plant in that city.

The **Alaskan Copper Works** of Seattle, Wash., is building a $15,000 addition to its plant for a machine shop.

Human Error ELIMINATED FROM INSPECTION AND COST MATERIALLY REDUCED!

Manual inspection of piston rings is not only tedious and costly but its effectiveness depends to a great extent on the skill of the inspector. However, unless the inspection is accurate and every ring falls within tolerance limits, either the assembly of the motor or its performance is jeopardized.

Sheffield has eliminated these obstacles by developing equipment for both users and manufacturers according to their individual needs.

Typical is the automatic gaging machine shown in Figure 1 now being used in a large automotive plant which inspects and classifies 2400 piston rings per hour on the basis of gap width (to a tolerance of .007") and ring thickness (to a tolerance of .0005"). Classifications are:

1 *rejects for oversize gap*
2 *rejects for undersize gap*
3 *rejects for oversize thickness*
4 *rejects for undersize thickness*
5 *acceptable gap and thickness*

All the operator has to do is to feed the machine and remove the inspected rings from each classification chute.

The automatic unit in Figure 2, which serves an aircraft engine manufacturer, automatically inspects both gap and periphery of piston rings and segregates them accordingly.

The manually loaded electronic Piston Ring Inspector (Figure 3) also checks both periphery and gap at a speed of less than 5 seconds per ring.

If you have mass inspection operations where dimensional tolerances are critical, *chek with Sheffield* on automatic equipment to reduce costs and increase the effectiveness of inspection.

the *Sheffield* corporation

Dayton 1, Ohio ***U. S. A.***

Standard Gages Shipped in 24 Hours

Sheffield MASTER CRAFTSMEN

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STARRETT EXHIBIT
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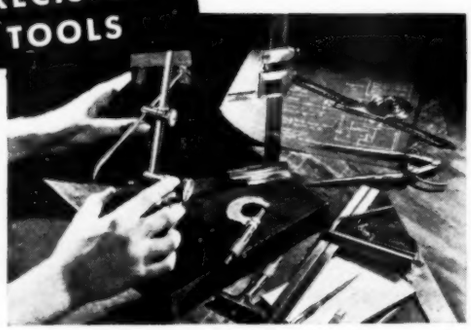
MACHINE TOOL SHOW
Chicago Sept. 17—26

PRECISION TOOLS

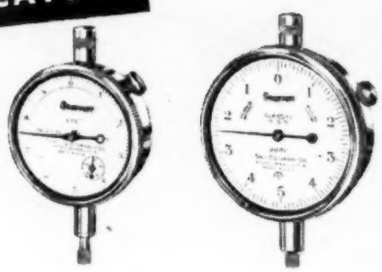


See the striking display of STARRETT Precision Measuring Tools including a comprehensive selection of Micrometers, Vernier Gages, Protractors, Squares and other fine mechanic's tools. A highlight of the exhibit.

STEEL TAPES and RULES

Tapes and Rules for every need and purpose in lengths and graduations to suit every requirement. You'll be amazed at the variety.

DIAL INDICATORS



Featuring a most complete array of STARRETT and LAST WORD Dial Indicators in all types, sizes and styles of dial graduation. Don't miss this display if you take pride in precision.

HACKSAWS and BAND SAWS

See the saws "Made by the World's Greatest Makers of Precision Tools" including hacksaws for hand and machine metal cutting and band saws for cutting metal, wood, plastics, etc.

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PRECISION TOOLS • DIAL INDICATORS • STEEL TAPES • GROUND FLAT STOCK
HACKSAWS • BAND SAWS FOR CUTTING METAL, WOOD, PLASTICS

Hot-Rolled Alloy Steels—I

REVISION of "Hot-Rolled Alloy Steels," Sec. 10, Steel Products Manual, has been accomplished by the General Technical Committee of the American Iron & Steel Institute. These revisions reflect current steelmaking problems.

Purchases from a standard list of alloy steels are important because they will expedite deliveries, improve service, develop more fully the application possibilities of the grades involved. When the original list was compiled in 1941, thousands of different chemical combinations of elements were required of the steel industry. More efficient production and distribution of steel, particularly in face of a rearmament program, required concentration on grades in most common demand and the combining of specifications having like requirements.

Despite valuable wartime experience with a limited number of available steels, there has been a drift back toward over-complexity in steel purchasing. But the current and foreseeable scrap situation makes it difficult to provide special analyses without delays and extra expense in meeting off-standard specifications. Besides, it is doubtful in many instances that purchasers have sufficiently close metallurgical and heat-treating control to get their money's worth from special alloys.

Section 10 covers only constructional alloy and electric furnace steels—blooms, billets, slabs and bars. Electric furnace steel is given the same classification as alloy steel because it must have the same special care in manufacture.

Alloy steels and electric furnace carbon steels can be furnished for cold rolling, cold drawing, cold heading, cold upsetting, cold forging, hot forging, heat-treating or carburizing.

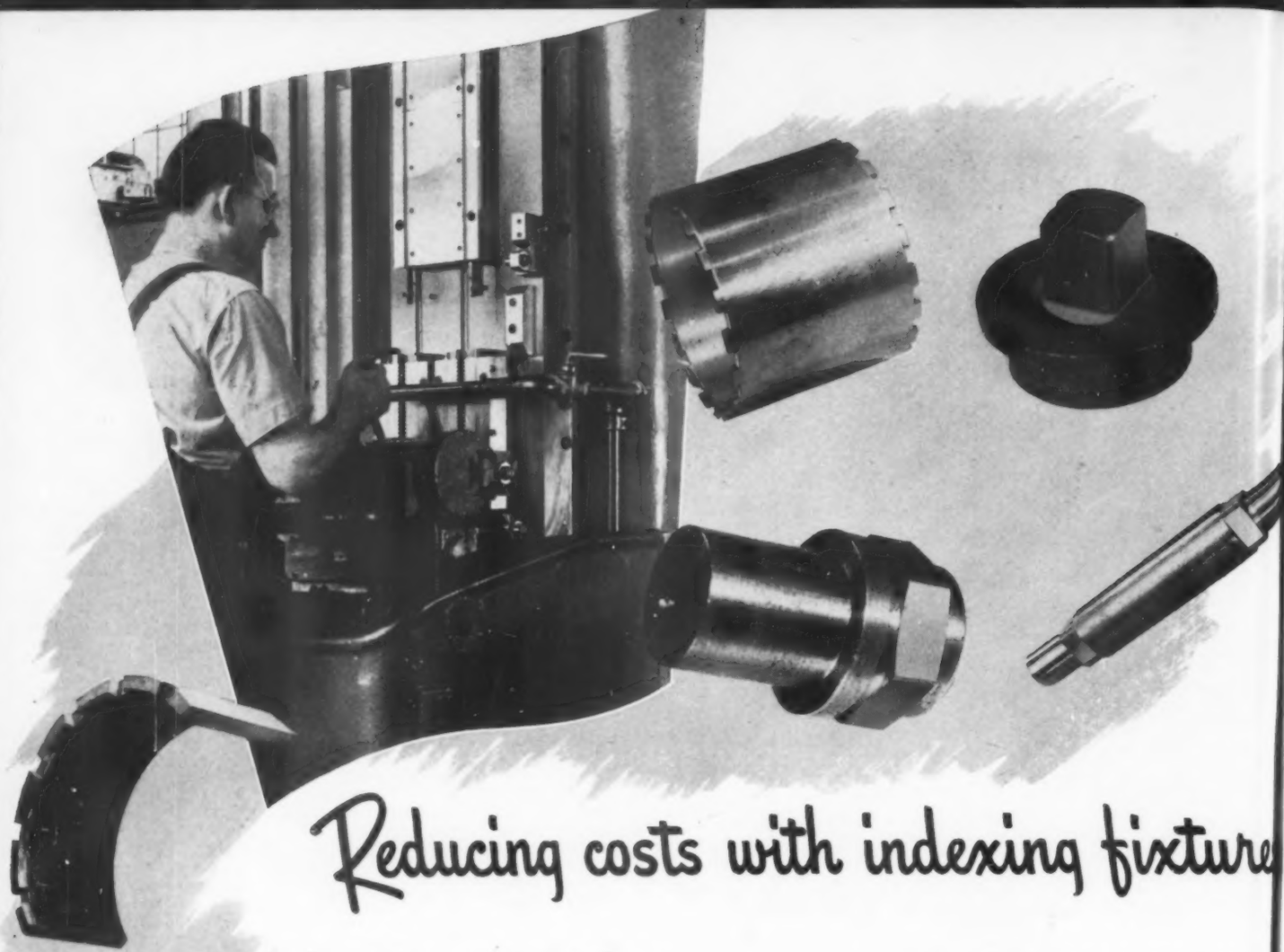
Blooms, billets and slabs are those whose cross-sectional area is reduced from that of the ingot by at least 50%. Following is range of sizes (not less than 4 ft. long and with hot-sheared ends): billets 4x4 to 7x7, or equivalent area; blooms, 7x7 in. and larger or equivalent area; slabs 2½ in. or thicker and 16 sq. in. or over in cross-sectional area. These products can also be furnished machine-cut to length.

Bars comprise a variety of cross-

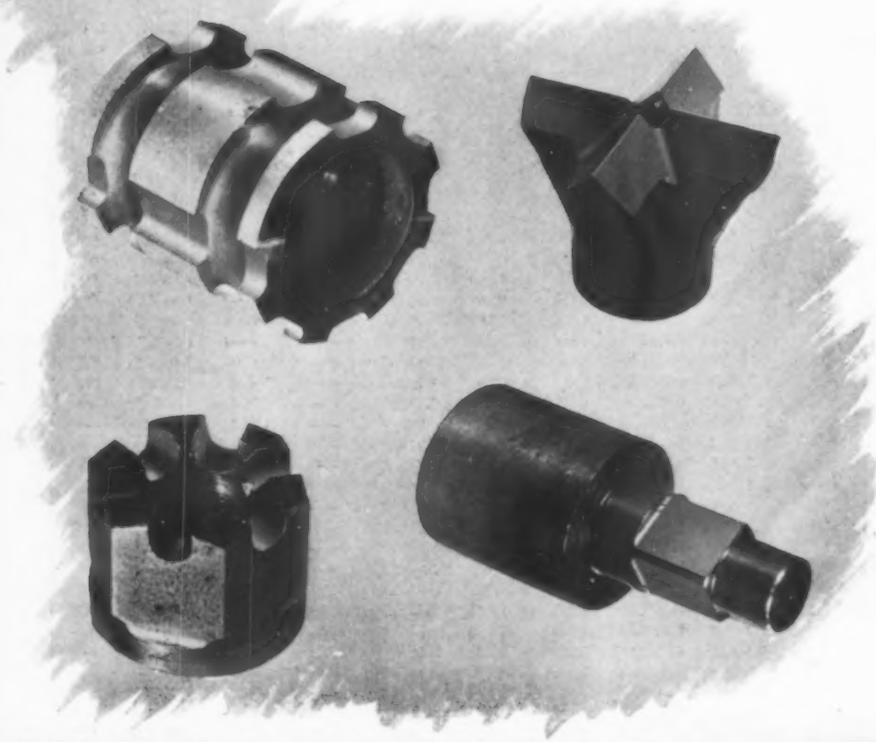
Standard Open-Hearth and Electric-Furnace Alloy Steels—Bars, Billets, Blooms and Slabs

The ranges and limits in this table apply only to material not exceeding 200 sq. in. in cross-sectional area, or 18 in. in width, or 10000 lb. weight per piece

AISI Number	Chemical Composition Limits, per cent								SAE Number
	C	Mn	P	S	Si	Ni	Cr	Other	
1320	0.18/0.23	1.60/1.90	0.040	0.040	0.20/0.35	—	—	—	1320
1321	0.17/0.22	1.80/2.10	0.050	0.050	0.20/0.35	—	—	—	—
1330	0.28/0.33	1.60/1.90	0.040	0.040	0.20/0.35	—	—	—	1330
1335	0.33/0.38	1.60/1.90	0.040	0.040	0.20/0.35	—	—	—	1335
1340	0.38/0.43	1.60/1.90	0.040	0.040	0.20/0.35	—	—	—	1340
2317	0.15/0.20	0.40/0.60	0.040	0.040	0.20/0.35	3.25/3.75	—	—	2317
2330	0.28/0.33	0.60/0.80	0.040	0.040	0.20/0.35	3.25/3.75	—	—	2330
2335	0.33/0.38	0.60/0.80	0.040	0.040	0.20/0.35	3.25/3.75	—	—	—
2340	0.38/0.43	0.70/0.90	0.040	0.040	0.20/0.35	3.25/3.75	—	—	2340
2345	0.43/0.48	0.70/0.90	0.040	0.040	0.20/0.35	3.25/3.75	—	—	2345
E2512	0.09/0.14	0.45/0.60*	0.025	0.025	0.20/0.35	4.75/5.25	—	—	2512
2515	0.12/0.17	0.40/0.60	0.040	0.040	0.20/0.35	4.75/5.25	—	—	2515
E2517	0.15/0.20	0.45/0.60*	0.025	0.025	0.20/0.35	4.75/5.25	—	—	2517
3115	0.13/0.18	0.40/0.60	0.040	0.040	0.20/0.35	1.10/1.40	0.55/0.75	—	3115
3120	0.17/0.22	0.60/0.80	0.040	0.040	0.20/0.35	1.10/1.40	0.55/0.75	—	3120
3130	0.28/0.33	0.60/0.80	0.040	0.040	0.20/0.35	1.10/1.40	0.55/0.75	—	3130
3135	0.33/0.38	0.60/0.80	0.040	0.040	0.20/0.35	1.10/1.40	0.55/0.75	—	3135
3140	0.38/0.43	0.70/0.90	0.040	0.040	0.20/0.35	1.10/1.40	0.55/0.75	—	3140
3141	0.38/0.43	0.70/0.90	0.040	0.040	0.20/0.35	1.10/1.40	0.70/0.90	—	3141
3145	0.43/0.48	0.70/0.90	0.040	0.040	0.20/0.35	1.10/1.40	0.70/0.90	—	3145
3150	0.48/0.53	0.70/0.90	0.040	0.040	0.20/0.35	1.10/1.40	0.70/0.90	—	3150
E3310	0.08/0.13	0.45/0.60*	0.025	0.025	0.20/0.35	3.25/3.75	1.40/1.75	—	3310
E3316	0.14/0.19	0.45/0.60*	0.025	0.025	0.20/0.35	3.25/3.75	1.40/1.75	—	—
								Mo	
4017	0.15/0.20	0.70/0.90	0.040	0.040	0.20/0.35	—	—	0.20/0.30	4017
4023	0.20/0.25	0.70/0.90	0.040	0.040	0.20/0.35	—	—	0.20/0.30	4023
4024	0.20/0.25	0.70/0.90	0.040	0.035/0.050	0.20/0.35	—	—	0.20/0.30	4024
4027	0.25/0.30	0.70/0.90	0.040	0.040	0.20/0.35	—	—	0.20/0.30	4027
4028	0.25/0.30	0.70/0.90	0.040	0.035/0.050	0.20/0.35	—	—	0.20/0.30	4028
4032	0.30/0.35	0.70/0.90	0.040	0.040	0.20/0.35	—	—	0.20/0.30	4032
4037	0.35/0.40	0.70/0.90	0.040	0.040	0.20/0.35	—	—	0.20/0.30	4037
4042	0.40/0.45	0.70/0.90	0.040	0.040	0.20/0.35	—	—	0.20/0.30	4042
4047	0.45/0.50	0.70/0.90	0.040	0.040	0.20/0.35	—	—	0.20/0.30	4047
4053	0.50/0.56	0.75/1.00	0.040	0.040	0.20/0.35	—	—	0.20/0.30	4053
4063	0.60/0.67	0.75/1.00	0.040	0.040	0.20/0.35	—	—	0.20/0.30	4063
4068	0.63/0.70	0.75/1.00	0.040	0.040	0.20/0.35	—	—	0.20/0.30	4068
4130	0.28/0.33	0.40/0.60	0.040	0.040	0.20/0.35	—	0.80/1.10	0.15/0.25	4130
E4132	0.30/0.35	0.40/0.60	0.025	0.025	0.20/0.35	—	0.80/1.10	0.18/0.25**	—
E4135	0.33/0.38	0.70/0.90	0.025	0.025	0.20/0.35	—	0.80/1.10	0.18/0.25**	—
4137	0.35/0.40	0.70/0.90	0.040	0.040	0.20/0.35	—	0.80/1.10	0.15/0.25	4137
E4137	0.35/0.40	0.70/0.90	0.025	0.025	0.20/0.35	—	0.80/1.10	0.18/0.25	—
4140	0.33/0.43	0.75/1.00	0.040	0.040	0.20/0.35	—	0.80/1.10	0.15/0.25	4140
4142	0.40/0.45	0.75/1.00	0.040	0.040	0.20/0.35	—	0.80/1.10	0.15/0.25	—
4145	0.43/0.48	0.75/1.00	0.040	0.040	0.20/0.35	—	0.80/1.10	0.15/0.25	4145
4147	0.45/0.50	0.75/1.00	0.040	0.040	0.20/0.35	—	0.80/1.10	0.15/0.25	—
4150	0.48/0.53	0.75/1.00	0.040	0.040	0.20/0.35	—	0.80/1.10	0.15/0.25	4150
4317	0.15/0.20	0.45/0.65	0.040	0.040	0.20/0.35	1.65/2.00	0.40/0.60	0.20/0.30	4317
4320	0.17/0.22	0.45/0.65	0.040	0.040	0.20/0.35	1.65/2.00	0.40/0.60	0.20/0.30	4320
4337	0.35/0.40	0.60/0.80	0.040	0.040	0.20/0.35	1.65/2.00	0.70/0.90	0.20/0.30	—
4340	0.38/0.43	0.60/0.80	0.040	0.040	0.20/0.35	1.65/2.00	0.70/0.90	0.20/0.30	4340
4608	0.06/0.11	0.25/0.45	0.040	0.040	0.25 Max.	1.40/1.75	—	0.15/0.25	4608
4615	0.13/0.18	0.45/0.65	0.040	0.040	0.20/0.35	1.65/2.00	—	0.20/0.30	4615
E4617	0.15/0.20	0.45/0.65	0.025	0.025	0.20/0.35	1.65/2.00	—	0.20/0.27***	—
4620	0.17/0.22	0.45/0.65	0.040	0.040	0.20/0.35	1.65/2.00	—	0.20/0.30	4620
X4620	0.18/0.23	0.50/0.70	0.040	0.040	0.20/0.35	1.65/2.00	—	0.20/0.30	X4620
E4620	0.17/0.22	0.45/0.65	0.025	0.025	0.20/0.35	1.65/2.00	—	0.20/0.27	—
4621	0.18/0.23	0.70/0.90	0.040	0.040	0.20/0.35	1.65/2.00	—	0.20/0.30	4621
4640	0.38/0.43	0.60/0.80	0.040	0.040	0.20/0.35	1.65/2.00	—	0.20/0.30	4640
E4640	0.33/0.43	0.60/0.80	0.025	0.025	0.20/0.35	1.65/2.00	—	0.20/0.27	—
4812	0.10/0.15	0.40/0.60	0.040	0.040	0.20/0.35	3.25/3.75	—	0.20/0.30	4812
4815	0.13/0.18	0.40/0.60	0.040	0.040	0.20/0.35	3.25/3.75	—	0.20/0.30	4815



Reducing costs with indexing fixture



• Lower cost per piece for parts with a number of duplicate machined surfaces is being attained in many cases thru the use of surface broaching machines with indexing fixtures. On most pieces the indexing is automatic thru the complete broaching cycle. Some operations can be handled thru simple manual indexing. In all cases parts are finished faster and at lower cost than with the ordinary machining methods. Your blueprints and figures on hourly production requirements are all that are required. We will be glad to make our recommendations.

THE FOOTE-BURT COMPANY • Cleveland 8, Ohio
Detroit Office: General Motors Building

FOOTBURT

Surface Broaching

FOOTBURT PATENTED TOOTH FORM

Hot-Rolled Alloy Steels—II

sections and sizes summarized thus:

Rounds, squares and round-cornered squares—7/32 in. and larger in thickness or diameter.

Flats—widths ¼ to 6 in. inclusive, with thickness from 13/64 to 4 in. inclusive.

Spring flats—widths 1-7/16 to 6 in. inclusive and thicknesses 0.171 to 0.750 in.

Hexagons—¼ in. and larger.

Octagons—¼ in. and larger.

Machining Allowance

When ordering bars that are to be machined, it is recommended that the purchaser make adequate allowance for machining, and specify hot-rolled sizes accordingly. These allowances require consideration of the manufacturing practice utilized to remove surface metal, the length and size of bars, straightness and out-of-round tolerance. It is recommended the allowances be adequate to permit actual stock removal from the surface of not less than the amount shown below:

Specified Sizes, in.	Minimum Stock Removal from the Surface, in.
Up to 5/8 incl.	0.016
Over 5/8 to 7/8 incl.	0.021
Over 7/8 to 1 incl.	0.025
Over 1 to 1 1/8 incl.	0.025
Over 1 1/8 to 1 1/4 incl.	0.028
Over 1 1/4 to 1 3/8 incl.	0.030
Over 1 3/8 to 1 1/2 incl.	0.033
Over 1 1/2 to 2 incl.	0.042
Over 2 to 2 1/2 incl.	0.052
Over 2 1/2 to 3 1/2 incl.	0.072
Over 3 1/2 to 4 1/2 incl.	0.090
Over 4 1/2 to 5 1/2 incl.	0.110
Over 5 1/2 to 6 1/2 incl.	0.125
Over 6 1/2 to 8 incl.	0.155

Foot Notes for Table

*For open-hearth steel the manganese is 0.40 to 0.60%.

**For open-hearth steel the molybdenum is 0.15 to 0.25%.

***For open-hearth steel the molybdenum is 0.20 to 0.30%.

Note 1. Grades shown in the above list with prefix letter E are manufactured by the basic electric furnace process.

All others are normally manufactured by the basic open-hearth process.

Note 2. The phosphorus and sulphur limitations for each process shall be as follows:

Basic electric furnace	—0.025	maximum %
Basic open-hearth	—0.04	maximum %
Acid electric furnace	—0.05	maximum %
Acid open-hearth	—0.05	maximum %

Note 3. Lowest minimum silicon limit to be specified for acid open-hearth or acid electric furnace alloy steel is 0.15%.

Note 4. Small quantities of certain elements may be found in alloy and electric furnace carbon steels which are not specified or required. These elements are to be considered as incidental and acceptable to the following maximum amounts: Copper, 0.35%; Nickel, 0.25%; Chromium, 0.20% and Molybdenum, 0.06%.

Note 5. Where minimum and maximum sulphur content is shown it is indicative of resulphurized steels.

Standard Open-Hearth and Electric-Furnace Alloy Steels—Bars, Billets, Blooms and Slabs

The ranges and limits in this table apply only to material not exceeding 200 sq. in. in cross-sectional area, or 18 in. in width, or 10000 lb. weight per piece

AISI Number	Chemical Composition Limits, per cent								SAE Number
	C	Mn	P	S	Si	Ni	Cr	Other	
4817	0.15/0.20	0.40/0.60	0.040	0.040	0.20/0.35	3.25/3.75	—	0.20/0.30	4817
4820	0.18/0.23	0.50/0.70	0.040	0.040	0.20/0.35	3.25/3.75	—	0.20/0.30	4820
5045	0.43/0.48	0.70/0.90	0.040	0.040	0.20/0.35	—	0.55/0.75	Mo	5045
5046	0.43/0.50	0.75/1.00	0.040	0.040	0.20/0.35	—	0.20/0.35	—	—
5120	0.17/0.22	0.70/0.90	0.040	0.040	0.20/0.35	—	0.70/0.90	—	5120
5130	0.28/0.33	0.70/0.90	0.040	0.040	0.20/0.35	—	0.80/1.10	—	5130
5132	0.30/0.35	0.60/0.80	0.040	0.040	0.20/0.35	—	0.80/1.05	—	5132
5135	0.33/0.38	0.60/0.80	0.040	0.040	0.20/0.35	—	0.80/1.05	—	5135
5140	0.38/0.43	0.70/0.90	0.040	0.040	0.20/0.35	—	0.70/0.90	—	5140
5145	0.43/0.48	0.70/0.90	0.040	0.040	0.20/0.35	—	0.70/0.90	—	5145
5147	0.45/0.52	0.75/1.00	0.040	0.040	0.20/0.35	—	0.90/1.20	—	5147
5150	0.48/0.53	0.70/0.90	0.040	0.040	0.20/0.35	—	0.70/0.90	—	5150
5152	0.48/0.55	0.70/0.90	0.040	0.040	0.20/0.35	—	0.90/1.20	—	5152
E50100	0.95/1.10	0.25/0.45	0.025	0.025	0.20/0.35	—	0.40/0.60	—	50100
E51100	0.95/1.10	0.25/0.45	0.025	0.025	0.20/0.35	—	0.90/1.15	—	51100
E52100	0.95/1.10	0.25/0.45	0.025	0.025	0.20/0.35	—	1.30/1.60	—	52100
6120	0.17/0.22	0.70/0.90	0.040	0.040	0.20/0.35	—	0.70/0.90	V 0.10 Min.	—
6145	0.43/0.48	0.70/0.90	0.040	0.040	0.20/0.35	—	0.80/1.10	0.15 Min.	—
6150	0.48/0.53	0.70/0.90	0.040	0.040	0.20/0.35	—	0.80/1.10	0.15 Min.	6150
6152	0.48/0.55	0.70/0.90	0.040	0.040	0.20/0.35	—	0.80/1.10	0.10 Min.	—
8615	0.13/0.18	0.70/0.90	0.040	0.040	0.20/0.35	0.40/0.70	0.40/0.60	Mo 0.15/0.25	8615
8617	0.15/0.20	0.70/0.90	0.040	0.040	0.20/0.35	0.40/0.70	0.40/0.60	0.15/0.25	8617
8620	0.18/0.23	0.70/0.90	0.040	0.040	0.20/0.35	0.40/0.70	0.40/0.60	0.15/0.25	8620
8622	0.20/0.25	0.70/0.90	0.040	0.040	0.20/0.35	0.40/0.70	0.40/0.60	Mo 0.15/0.25	8622
8625	0.23/0.28	0.70/0.90	0.040	0.040	0.20/0.35	0.40/0.70	0.40/0.60	0.15/0.25	8625
8627	0.25/0.30	0.70/0.90	0.040	0.040	0.20/0.35	0.40/0.70	0.40/0.60	0.15/0.25	8627
8630	0.28/0.33	0.70/0.90	0.040	0.040	0.20/0.35	0.40/0.70	0.40/0.60	0.15/0.25	8630
8632	0.30/0.35	0.70/0.90	0.040	0.040	0.20/0.35	0.40/0.70	0.40/0.60	0.15/0.25	8632
8635	0.33/0.38	0.75/1.00	0.040	0.040	0.20/0.35	0.40/0.70	0.40/0.60	0.15/0.25	8635
8637	0.35/0.40	0.75/1.00	0.040	0.040	0.20/0.35	0.40/0.70	0.40/0.60	0.15/0.25	8637
8640	0.38/0.43	0.75/1.00	0.040	0.040	0.20/0.35	0.40/0.70	0.40/0.60	0.15/0.25	8640
8641	0.38/0.43	0.75/1.00	0.040	0.040/0.060	0.20/0.35	0.40/0.70	0.40/0.60	0.15/0.25	8641
8642	0.40/0.45	0.75/1.00	0.040	0.040	0.20/0.35	0.40/0.70	0.40/0.60	0.15/0.25	8642
8645	0.43/0.48	0.75/1.00	0.040	0.040	0.20/0.35	0.40/0.70	0.40/0.60	0.15/0.25	8645
8647	0.45/0.50	0.75/1.00	0.040	0.040	0.20/0.35	0.40/0.70	0.40/0.60	0.15/0.25	8647
8650	0.48/0.53	0.75/1.00	0.040	0.040	0.20/0.35	0.40/0.70	0.40/0.60	0.15/0.25	8650
8653	0.50/0.56	0.75/1.00	0.040	0.040	0.20/0.35	0.40/0.70	0.50/0.80	0.15/0.25	—
8655	0.50/0.60	0.75/1.00	0.040	0.040	0.20/0.35	0.40/0.70	0.40/0.60	0.15/0.25	8655
8660	0.55/0.65	0.75/1.00	0.040	0.040	0.20/0.35	0.40/0.70	0.40/0.60	0.15/0.25	8660
8720	0.18/0.23	0.70/0.90	0.040	0.040	0.20/0.35	0.40/0.70	0.40/0.60	0.20/0.30	8720
8735	0.33/0.38	0.75/1.00	0.040	0.040	0.20/0.35	0.40/0.70	0.40/0.60	0.20/0.30	8735
8740	0.38/0.43	0.75/1.00	0.040	0.040	0.20/0.35	0.40/0.70	0.40/0.60	0.20/0.30	8740
8742	0.40/0.45	0.75/1.00	0.040	0.040	0.20/0.35	0.40/0.70	0.40/0.60	0.20/0.30	—
8745	0.43/0.48	0.75/1.00	0.040	0.040	0.20/0.35	0.40/0.70	0.40/0.60	0.20/0.30	8745
8747	0.45/0.50	0.75/1.00	0.040	0.040	0.20/0.35	0.40/0.70	0.40/0.60	0.20/0.30	—
8750	0.48/0.53	0.75/1.00	0.040	0.040	0.20/0.35	0.40/0.70	0.40/0.60	0.20/0.30	8750
9255	0.50/0.60	0.70/0.95	0.040	0.040	1.80/2.20	—	—	—	9255
9260	0.55/0.65	0.70/1.00	0.040	0.040	1.80/2.20	—	—	—	9260
9261	0.55/0.65	0.75/1.00	0.040	0.040	1.80/2.20	—	0.10/0.25	—	9261
9262	0.55/0.65	0.75/1.00	0.040	0.040	1.80/2.20	—	0.25/0.40	—	9262
E9310	0.08/0.13	0.45/0.65	0.025	0.025	0.20/0.35	3.00/3.50	1.00/1.40	0.08/0.15	—
E9315	0.13/0.18	0.45/0.65	0.025	0.025	0.20/0.35	3.00/3.50	1.00/1.40	0.08/0.15	—
E9317	0.15/0.20	0.45/0.65	0.025	0.025	0.20/0.35	3.00/3.50	1.00/1.40	0.08/0.15	—
9437	0.35/0.40	0.90/1.20	0.040	0.040	0.20/0.35	0.30/0.60	0.30/0.50	0.08/0.15	9437
9440	0.38/0.43	0.90/1.20	0.040	0.040	0.20/0.35	0.30/0.60	0.30/0.50	0.08/0.15	9440
9442	0.40/0.45	1.00/1.30	0.040	0.040	0.20/0.35	0.30/0.60	0.30/0.50	0.08/0.15	9442
9445	0.43/0.48	1.00/1.30	0.040	0.040	0.20/0.35	0.30/0.60	0.30/0.50	0.08/0.15	9445
9747	0.45/0.50	0.50/0.80	0.040	0.040	0.20/0.35	0.40/0.70	0.10/0.25	0.15/0.25	9747
9763	0.60/0.67	0.50/0.80	0.040	0.040	0.20/0.35	0.40/0.70	0.10/0.25	0.15/0.25	9763
9840	0.38/0.43	0.70/0.90	0.040	0.040	0.20/0.35	0.85/1.15	0.70/0.90	0.20/0.30	9840
9845	0.43/0.48	0.70/0.90	0.040	0.040	0.20/0.35	0.85/1.15	0.70/0.90	0.20/0.30	9845
9850	0.46/0.53	0.70/0.90	0.040	0.040	0.20/0.35	0.85/1.15	0.70/0.90	0.20/0.30	9850

Get these facts about Electropolishing Stainless Steel Products

This may be an opportunity for you to cut polishing costs and give lustrous new sales appeal to your stainless steel products.

This improved process is called "Armco Electropolishing." It is a low-cost way to polish many stainless steel products in one operation by anodic treatment in an electrolytic bath. Parts with tiny recesses or of intricate design cannot escape the uniform polishing action of the chemical bath.

Armco Electropolishing has shown substantial savings for fabricators of practically all forms of ARMCO Stainless Steels, including wire, bars, forgings, sheets and strip.

If You Plate . . .

If your products are made of plated metals it may pay you to investigate the possibilities of ARMCO Stainless Steel—and the Electropolishing process. Many manufacturers have cut costs and made good products better by changing over to Electropolished stainless steel parts.

For more information about this cost-saving method of polishing stainless steels to a high luster, just fill in the handy coupon on this page. We'll send you a fact-filled folder on Armco Electropolishing titled "Polish Stainless Steels This Easy, Low-Cost Way." Mail it today! The American Rolling Mill Co., 329 Curtis St., Middletown, Ohio.

ARMCO ELECTROPOLISHING PROCESS

ARMCO

Send for this data folder

THE AMERICAN ROLLING MILL COMPANY
329 Curtis Street, Middletown, Ohio
Send me a copy of the folder titled "Polish Stainless Steels This Easy, Low-Cost Way."

Name _____ Title _____
Company _____
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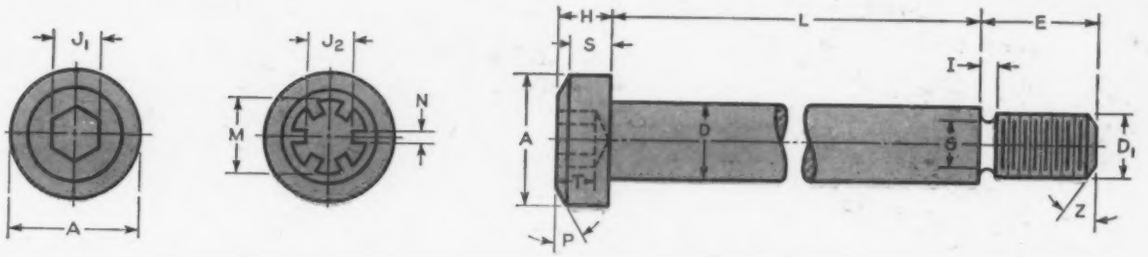
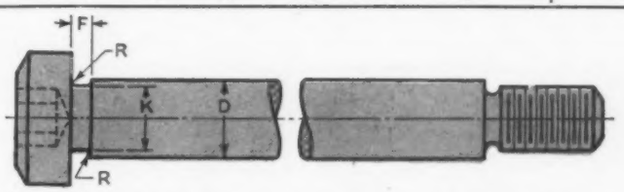
City _____ Zone No. _____ State _____

Stripper Bolts

Source: American Standards Association's Bulletin ASA B18.3 — 1947



Shoulder or Screw Diameter[1] D			Head Diameter[2] A		Head Height H		Head Side-Height S			Screw Thread Diameter	Length of Thread	Shoulder Length[3]
Nom	Max	Min	Max	Min	Max	Min	Nom	Max	Min	D_1	E	L
1/4	0.2480	0.2460	3/8	0.367	3/16	0.182	0.1615	0.1641	0.1589	10-24 NC-3	3/8 ± 0.010	3/4 to 2 1/2 ± 0.005
5/16	0.3105	0.3085	7/16	0.429	7/32	0.213	0.1869	0.1899	0.1839	1/4-20 NC-3	7/16 ± 0.010	1 to 3 ± 0.005
3/8	0.3730	0.3710	9/16	0.553	1/4	0.244	0.2123	0.2155	0.2091	5/16-18 NC-3	1/2 ± 0.010	1 to 4 ± 0.005
1/2	0.4980	0.4960	3/4	0.739	5/16	0.306	0.2631	0.2668	0.2594	3/8-16 NC-3	5/8 ± 0.015	1 1/4 to 5 ± 0.005
5/8	0.6230	0.6210	7/8	0.863	3/8	0.368	0.3139	0.3181	0.3097	1/2-13 NC-3	3/4 ± 0.015	1 1/2 to 6 ± 0.005
3/4	0.7480	0.7460	1	0.987	1/2	0.492	0.4296	0.4341	0.4251	5/8-11 NC-3	7/8 ± 0.015	1 1/2 to 8 ± 0.005
1	0.9980	0.9960	1 1/16	1.297	5/8	0.616	0.5312	0.5366	0.5258	3/4-10 NC-3	1 ± 0.015	1 1/2 to 8 ± 0.005
1 1/4	1.2480	1.2460	1 3/4	1.733	3/4	0.741	0.6327	0.6386	0.6268	7/8-9 NC-3	1 1/8 ± 0.015	1 1/2 to 8 ± 0.005
												Below 1" to 1/8" intervals
												1 to 5" to 1/4" intervals
												5 to 7" to 1/2" intervals
												Over 7" to 1" intervals



Diameter of Neck G		Width of Neck	Socket Width Across Flats J[1]		Socket Diameter Minor J[2]		Socket Diameter Major M		Width of Socket Land N		Diameter of Neck K*		Width of Neck	Fillet Radius R*		Screw Diameter
Max	Min	I	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	F*	Max	Min	
0.145	0.136	1/16	0.1270	1/8	0.128	0.126	0.149	0.147	0.032	0.030	0.243	0.240	3/32	0.020	0.015	1/4
0.196	0.185	5/64	0.1582	5/32	0.163	0.161	0.188	0.186	0.039	0.037	0.305	0.302	3/32	0.020	0.015	5/16
0.252	0.240	5/64	0.1895	3/16	0.190	0.188	0.221	0.219	0.050	0.048	0.368	0.365	3/32	0.025	0.020	3/8
0.307	0.294	3/32	0.2520	1/4	0.254	0.252	0.298	0.296	0.068	0.066	0.493	0.490	3/32	0.025	0.020	1/2
0.417	0.400	1/8	0.3155	5/16	0.319	0.316	0.380	0.377	0.092	0.089	0.618	0.615	3/32	0.030	0.025	5/8
0.526	0.507	9/64	0.3780	3/8	0.386	0.383	0.463	0.460	0.112	0.109	0.743	0.740	3/32	0.030	0.025	3/4
0.642	0.620	5/32	0.5030	1/2	0.535	0.531	0.631	0.627	0.149	0.145	0.993	0.990	1/8	0.035	0.030	1
0.755	0.731	11/64	0.6290	5/8	0.685	0.681	0.801	0.797	0.189	0.185	1.243	1.240	1/8	0.035	0.030	1 1/4

Dimensions given in inches.

[1] Body or Shoulder (D) refers to the unthreaded portion of the screw and the maximum diameter conforms to the basic diameter or size of the screw.

[2] Concentricity of head, body and thread shall be such as to permit acceptance when checked with a compound Go Gage which will gage the maximum diameters of these parts simultaneously. This gage shall have the head and body diameters at their maximum values but expressed to four decimal places.

[3] Shoulder Length (L). The length of the screw shall be measured on a line parallel to the axis, from the plane of the bearing surface under the head to the plane of the flat at neck.

[4] Minimum Radius 0.03 in. (at corners of neck bottom) (G).

Screw Point Chamfer (Z). The point shall be flat and chamfered. The flat shall be normal to the axis of the screw and the chamfer (Z) shall be at an angle of 35 deg + 5 deg — 0 deg with the plane of the flat. The chamfer shall extend to the bottom of the thread. The edge between flat and chamfer shall be slightly rounded.

Socket Depth. Maximum socket depth (T) should not exceed three-fourths of minimum head height (H).

Head Chamfer (P). The head shall be flat and chamfered. The flat shall be normal to the axis of the screw and the chamfer (P) shall be at an angle of 30 deg ± 2 deg with the surface of the flat. The edge between flat and chamfer shall be slightly rounded.

* Neck under head (optional with manufacturers).

Neck diameter (K) Min = K (Max) — 0.003.

Announcing

A NEW TOOL ROTATING DOUBLE END CHUCKING MACHINE

Fast Index, Power Chucking, Steady High Production

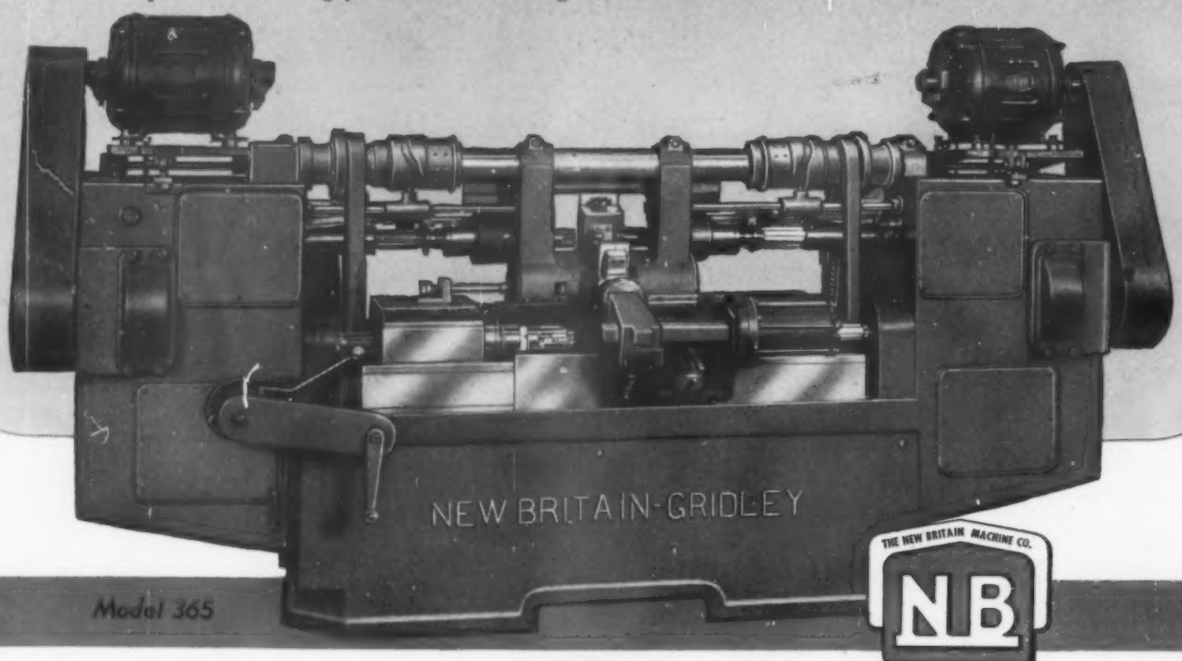
Featuring **1.** A four-chuck horizontal indexing turret with three work spindles on each side. One position for loading. Rough and finish bore, face, drill or ream in the first two positions; finish ream or thread in third position.

2. Over-all weight, power, and rigidity make possible the use of carbide tools and dampen any tendency to vibrate when running at high speeds.

3. Anti-friction spindles mounted in positionable quills carried in slides to minimize overhang. Spindle speeds up to 2,000 RPM have been provided for fast machining of non-ferrous metals.

4. Ease of operation. Loading position is waist high. All controls within easy reach of operator. Automatic chucking quickly accomplished. Many types of pieces may be magazine loaded. Until fully inter-locked safety devices are satisfied, turret will not index nor tools jump.

5. High production. Rapid jump and drawback on all feeds. Total idle time of index - 1.67 seconds. Two pieces may be finished at one chucking on some jobs. Geneva motion index and locking mechanism completely enclosed and guarded against dirt and chips. Either lead screw threading or lead cam threading to take full advantage of self-opening dies or collapsing taps available in No. 3 position. Threading spindles may have different speeds and feeds and will reverse within closest limits on each successive cut.



IN THE MIDST OF EVERYTHING AT THE SHOW

We will have one of these machines in our Booth No. 311 at the Show. We will also have a complete line of six spindle automatic screw machines, four, six and eight spindle chucking machines, a precision contour turning and boring machine, and a new revolutionary turret lathe. We'll be seeing you September 17.

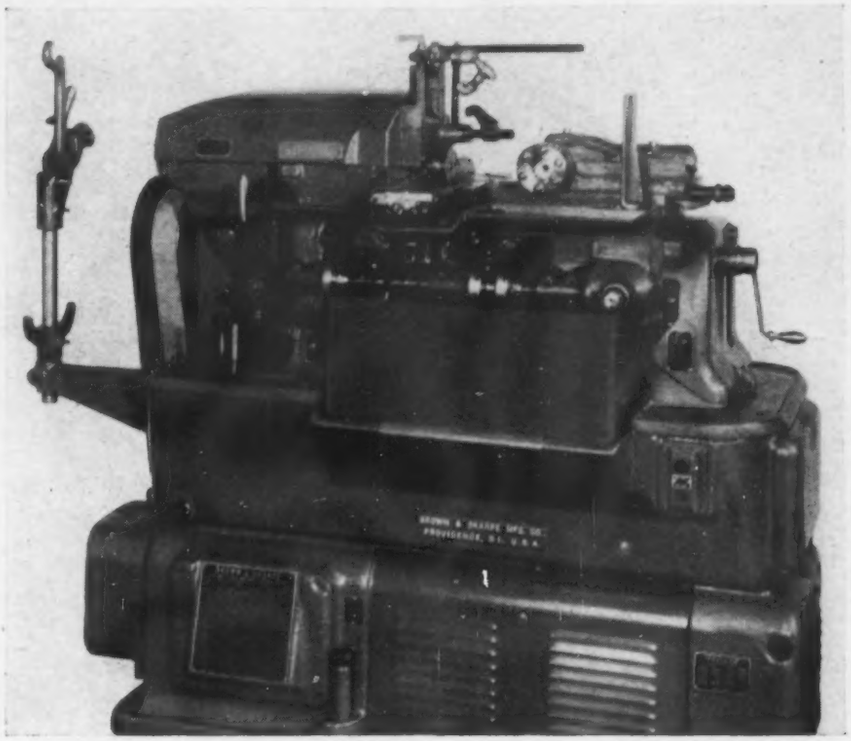
M-01059

NEW BRITAIN

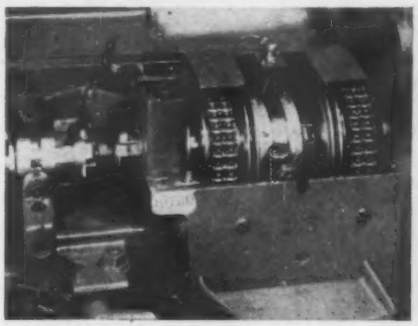
Automatics

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT

Shop Equipment News



Materials from tough alloy steels to free-cutting plastics can be handled by this No. 0G machine



The spindle is driven by multiple-width roller chains from the speed and ratio change gears in the base. Chains have predetermined adjustment, remain unchanged with all combinations of speed and direction

Automatic Screw Machines Redesigned For Wider Range by Brown & Sharpe

Nos. 00G and 0G high-speed automatic screw and automatic cutting-off machines have been redesigned by Brown & Sharpe Mfg. Co., Providence 1, R. I. They will be exhibited at the Machine Tool Show. The cutting-off machines are the same as the screw machines, except that they use a single-tool slide in place of a turret.

The spindle is of unit construction and can be removed. Spindle speeds in 196 two-speed combinations are provided in 16 groups. Each group has a high speed with which any one of 12 low speeds can be used in combination. Ratios of high to low speeds range from approximately 1.6:1 to 13:1, except for the highest and lowest high speeds where ratios are from 1.6:1 to 11:1.

The wide range of ratios permits using correct threading or tapping speeds without limiting forming, drilling or other high turning-speed operations. The range of high and low speeds is said to provide efficient cutting of materials from tough alloy steels to free-cutting plastics on a wide range of diameters.

The high and low speeds can be forward and backward, and in the same or opposite directions (except the ten combinations giving the highest total rpm. which can be used in only the same direction). All changes in speed and ratio are made by changing one pair of pick-off gears in the base. A set of 16 gears provides all changes. Direction of high speed is controlled by a manual built-in reversing switch, while low-speed direction, relative to high speed, is changed by moving a gear from one center to another.

The speed of the driving shaft can be reduced to provide additional feeding length. This also permits the production time per piece per cycle to be increased if necessary. If the number of operations required per part permits, the cams can be designed and the trip dogs set to make more than one piece per cycle.

The idle machine movements such as changing speed, feeding stock and indexing turret are performed at constant rapid rate independent of spindle and production speeds. The swing stop for stock is independent of the turret and operates in conjunction with the feeding mechanism. It leaves all six turret holes free for tools, and permits use of a single tool without indexing.

A combination magnetic starter and disconnect switch is mounted in the electrical compartment illustrated. When the lever is turned to open the door, a safety device operates the disconnect switch and shuts off the current.

Major mechanisms and bearing surfaces receive automatic lubrication. Various safety devices are incorporated. One is a spring device in the stock-feeding mechanism to prevent breakage in case of inter-

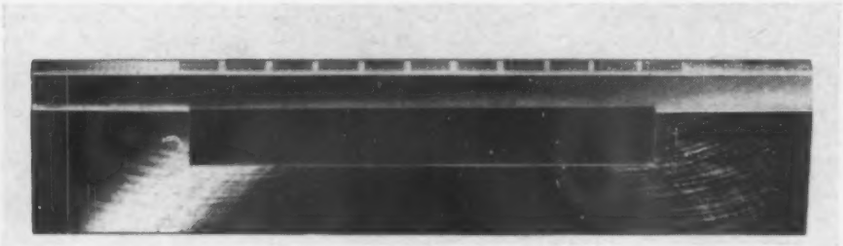
Electrical controls are built into a compartment in the rear of the machine. Overload relays with manual reset are provided

ference with the advance of the feed tube.

Spindle speeds on the No. 00G machine are from 50 to 6050 rpm. The driving motor is 2 hp. The hole through the largest regular-capacity feeding finger is ⅜-in. dia. A single movement of the feeding mechanism feeds any length to 1 in. at 240-rpm. driving-shaft speed. Up to 2-in. can be fed at 120 rpm., and greater lengths are fed by successive movements. Turret-slide movement permits turning any length to ¾ in.

On the No. 0G spindle speeds are 35 to 4230 rpm., while the motor is 3 hp. Largest feeding-finger hole is ⅝-in. dia. Feed is to 2-in. length at 180-rpm. driving-shaft speed, 3 in. at 120 rpm. Turret-slide movement permits turning lengths to 1¼ in.

The same improvements built into the Nos. 00G and 0G machines have been built into the larger No. 2G, which has 1- or 1½-in. capacity spindle.



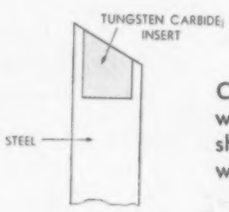
Supported construction of this blade makes possible a deep layer of tungsten carbide, which would permit many resurfacings

Centerless-Grinder Work-Rest Blade Made by Cliff with Carbide Inserts

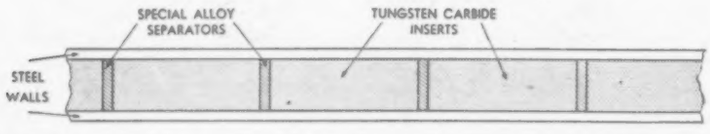
A centerless-grinder work-rest blade which combines the hardness of tungsten carbide with the strength of steel has been developed by The Cliff Co., 17 N. Leclaire Ave., Chicago 44, Ill. The design of the Clifco blade features sectional inserts of tungsten carbide at the wearing surface. The inserts are separated by thin strips of specially developed alloy and laid in a slot with supporting walls of steel.

The supporting separators and steel walls around the inserts are said to prevent chipping on jobs where brittleness makes ordinary tungsten-carbide blades useless. The supporting walls also permit the use of a harder carbide (grade CA-4 Carmet), thus providing high abrasion resistance. The supported construction makes it possible to lay the carbide four times as deep as on conventional blades. This would permit many more resurfacings.

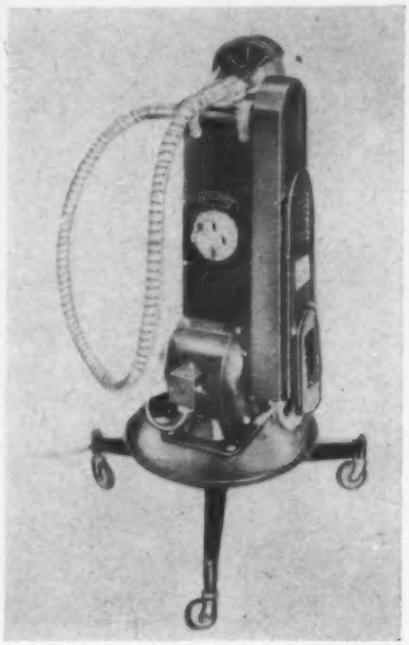
According to the manufacturer, the blade has reduced work-hour blade cost as much as 85% for some operations. Besides providing a tungsten-carbide surface for rough grind and other jobs where only chilled or tool steel could be used in the past, it is said to last many times as long as a straight tungsten-carbide blade on operations such as finish grinding.



Cross-section of working surface shows how steel walls support insert



Top view of a section of the working surface shows sectional-insert design



Wyzenbeek's Flexible-Shaft Unit Gives Infinitely Variable Speed

A variable-speed flexible-shaft machine is announced by Wyzenbeek & Staff, Inc., 838 W. Hubbard St., Chicago 22, Ill. Known as Wycomatic Speed Changer, it incorporates a dial control to instantly provide any speed within its range. It can perform jobs such as wire brushing, sanding, burring and grinding.

The safety cabinet swivels on a ball-bearing motor base and fully encloses the speed-change mechanism and belt guard. The center of gravity is low to prevent tipping over. An eccentric lock can be used to hold the handpiece so that the machine can be used as a stationary grinder.

Four models are available: ½- and ¾-hp. units with speed from 1800 to 4000 rpm.; ¾-hp. unit with speed from 3000 to 5800 rpm.; and 1-hp. unit with a speed range from 2200 to 4200 rpm.

See it Done AT THE MACHINE TOOL SHOW

BOOTH 312

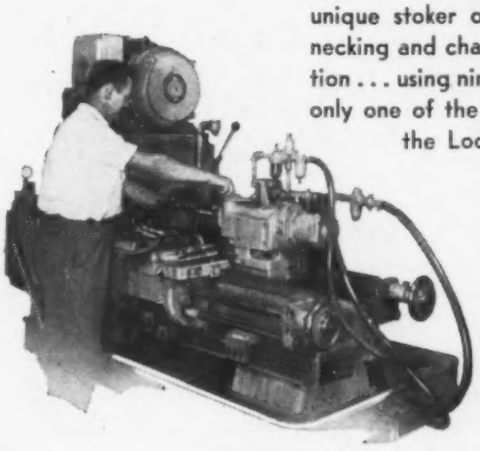
1947 MACHINE TOOL SHOW CHICAGO SEPT 17-26

Whether you're from Missouri, California or New York . . . you'll see an amazing demonstration of the speed and versatility of the new Lodge & Shipley 2-A Duomatic (automatic) Lathe at the Show.

Observe complete machining of this unique stoker output shaft . . . turning, necking and chamfering . . . in one operation . . . using nine carbide tipped tools . . . only one of the many unusual features at the Lodge & Shipley display.

From a rough forging to a finished shaft . . . in 2/5 of a minute. That's production . . . and but a single example of the versatility of the 2-A Duomatic on large or small lots.

Make a note now to see this impressive demonstration . . . and, if you have a problem . . . bring it along. Lodge & Shipley Engineers will be glad to offer advice on the latest in lathe production methods and equipment.



THE Lodge & Shipley COMPANY

CINCINNATI 25, OHIO

MACHINE TOOL DIVISION • 3055 COLERAIN
SPECIAL PRODUCTS DIVISION • 800 EVANS ST.

The duplex ram of this press is mounted in a cylinder machined in the main ram

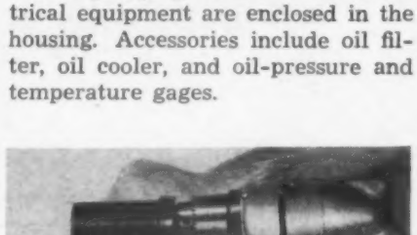
Duplex or Compression Molding Performed on Lake Erie Press

A press for duplex or compression molding has been developed by Lake Erie Engineering Corp., Buffalo 17, N. Y. Said to save 20 to 30% molding time, it has an upstroke duplex ram mounted inside the main ram. A jack ram provides rapid approach stroke.

The unit is self-contained, single action and semi-automatic. While the main ram has 200-ton capacity with 20-ton pullback, the duplex ram has 50-ton capacity with 10-ton pullback. Grids are 30-in. (right to left) by 24 in., while there is 30-in. daylight between grids. Height above floor level is 7½ ft., and pit depth is 35 in. Stroke of the main ram is 14 in., and stroke of the duplex is 8 in.

Control is by pushbutton with automatic timers, stripper reset and limit switches for upstroke, return stroke and slowdown. The main ram can be inched up and down, and automatic hold and breathe timers can be cut out of the circuit. The inside ram can be inched upwards while the main ram is held down. Pressures of the two rams are individually controlled with dials provided for presetting the pressures.

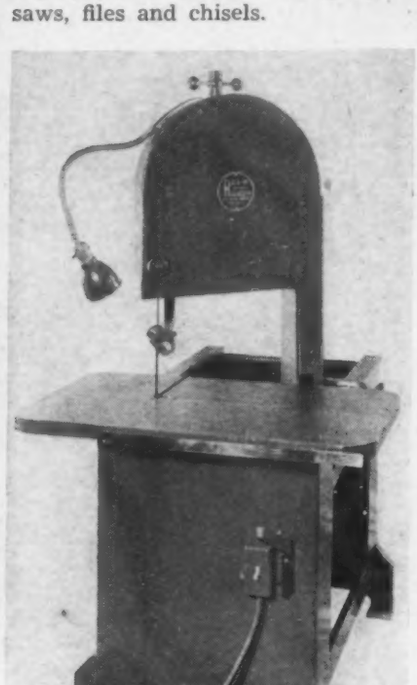
The pumping unit and all electrical equipment are enclosed in the housing. Accessories include oil filter, oil cooler, and oil-pressure and temperature gages.



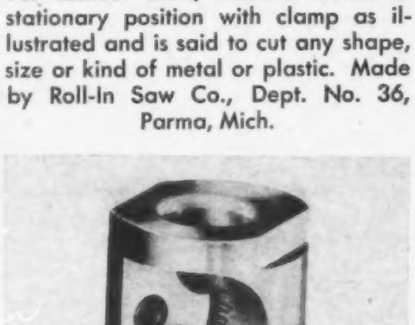
Uni-Tool Attachment for Drills Does Sanding, Sawing, Filing

The Uni-Tool attachment for any type of electric drill, air drill or drillpress that will receive a 1-in. shank is available from Lakeview Mfg. Co., P.O. Box 4080, Portland 8, Ore. It can be operated at any speed to 2500 rpm. All types of saw, chisel, knife and scraper blades, and files and other accessories can be fastened to the tool.

Illustrated is a Uni-Sander attached to a Uni-Tool. This arrangement converts the electric drill to a power-sanding attachment. The Uni-Sander is given the same reciprocating motion that the unit gives to saws, files and chisels.

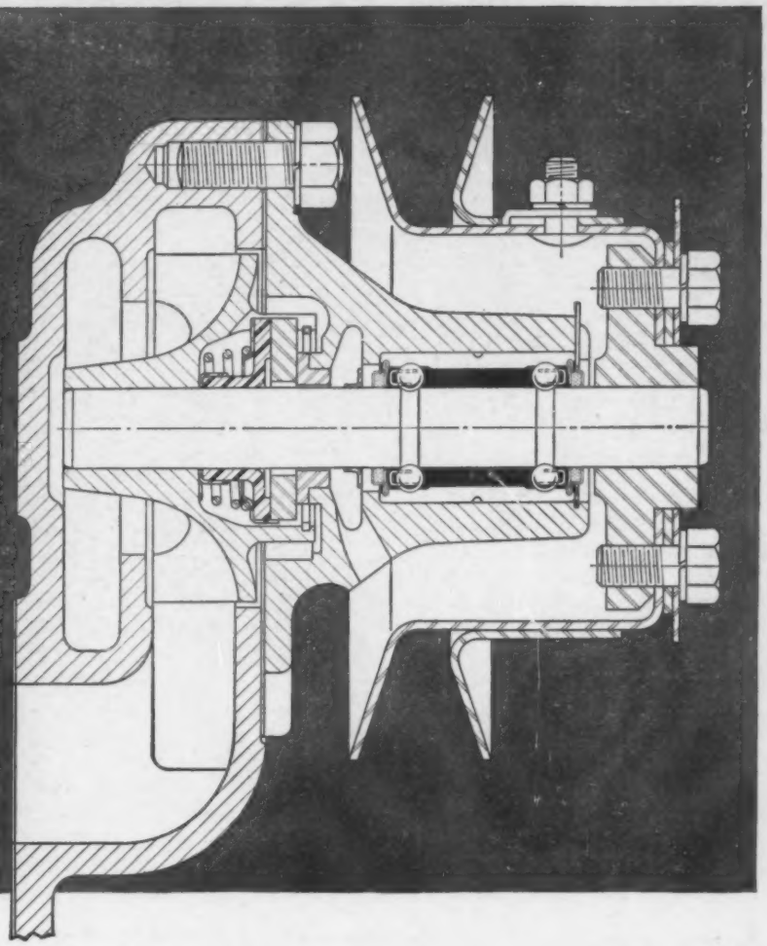


BANDSAW operates on principle of gravity feed, acts as two machines. As cutoff saw with gravity feed, the blade rolls into work with correct pressure automatic, saving wear on blades. For contour work, blade is locked in stationary position with clamp as illustrated and is said to cut any shape, size or kind of metal or plastic. Made by Roll-In Saw Co., Dept. No. 36, Parma, Mich.



CUTTER for dressing or pointing up burned and deformed welding tips in electric spotwelders without removing tip from machine. Made in any form or size, the cutter is said to be easily resharpened. Made by Conical Tool Co., 443 Division, South, Grand Rapids 3, Mich., it is designed to form tips in a few seconds

Pumps *as it* Blows



The two ends of the shaft that forms the inner race of this unique New Departure bearing are total strangers.

One carries a water pump; the other a cooling fan and pulley. Neither knows what the other is doing because they are separated by two rows of tough, chrome alloy steel balls, running in a permanent supply of grease, protected on both sides by efficient seals.

An original New Departure developement, the unit Fan and Waterpump bearing has proved its stamina and value in many thousands of engines of different kinds literally throughout the world.

Today, this streamlined, dual purpose bearing is just a "natural" for modern engines in tractors, trucks, passenger cars and vehicles of every kind. Easy to install — requires no maintenance.

Fan and Pumpshaft bearing as applied in a modern tractor engine.

This New Departure Fan and Pump bearing is still in good condition after 124,000 miles of extra hard service in long distance trucking.

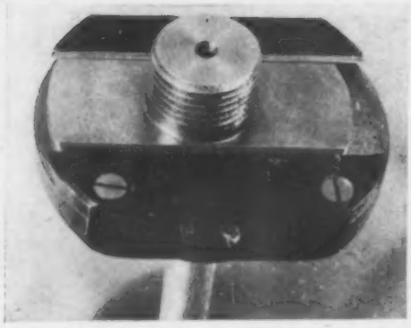
nothing rolls like a ball

NEW DEPARTURE

BALL BEARINGS

9484-C

NEW DEPARTURE • Division of GENERAL MOTORS • BRISTOL, CONN. • Branches in DETROIT, CHICAGO, LOS ANGELES and Other Principal Cities



Chambliss Elliptical Chuck Fastens to Nose of Lathe

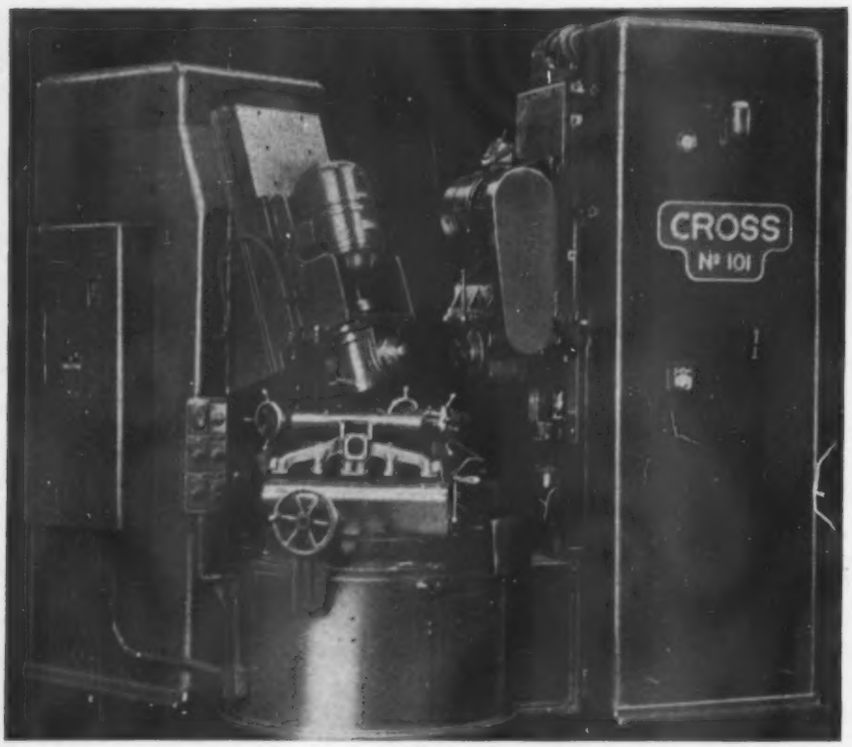
An elliptical chuck has been developed by H. D. Chambliss, 111 Clarion Rd., Oak Ridge, Tenn. It fastens to the nose of a lathe and holds conventional chucks or faceplates. These in turn hold work which can be turned or bored into elliptical shapes. Work such as elliptical or oval-shaped punches and dies, elliptical gears, bars or mandrels, and three dimensional forms can be turned with the device.

The slide of the unit carries the chuck or faceplate. It reciprocates with respect to the drive plate, but rotates with it. The drive plate screws onto the lathe nose and rotates with the lathe spindle, while an eccentric block is held stationary by a shaft through the spindle. The eccentric furnishes the reciprocal movement to the slide.

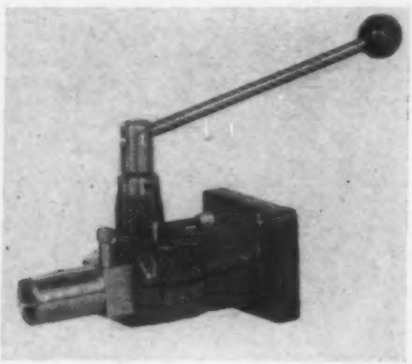
FORK-ROTATING MECHANISM dumps scrap from tote box into truck. Can also be used for handling of rolls. Device is made by Clark Tructractor, Div. Clark Equipment Co., Battle Creek, Mich. It is operated by hydraulic motor and gear reduction, and it is adaptable to fixed or adjustable forks, scoop or other special attachments

Yelloy Polystyrene Tubes Cut Spray in Plating Tanks

Chrome spray floats have been introduced by Hanson-Van Winkle-Munning Co., Matawan, N. J., for use in chromium-plating tanks. They are laid on the solution to a thickness of about 1 in., forming a blanket to cut spray and conserve heat. The floats are yellow polystyrene tubes. They are enclosed and are 2¾ in. long. They do not adhere to or interfere with work in the tank.



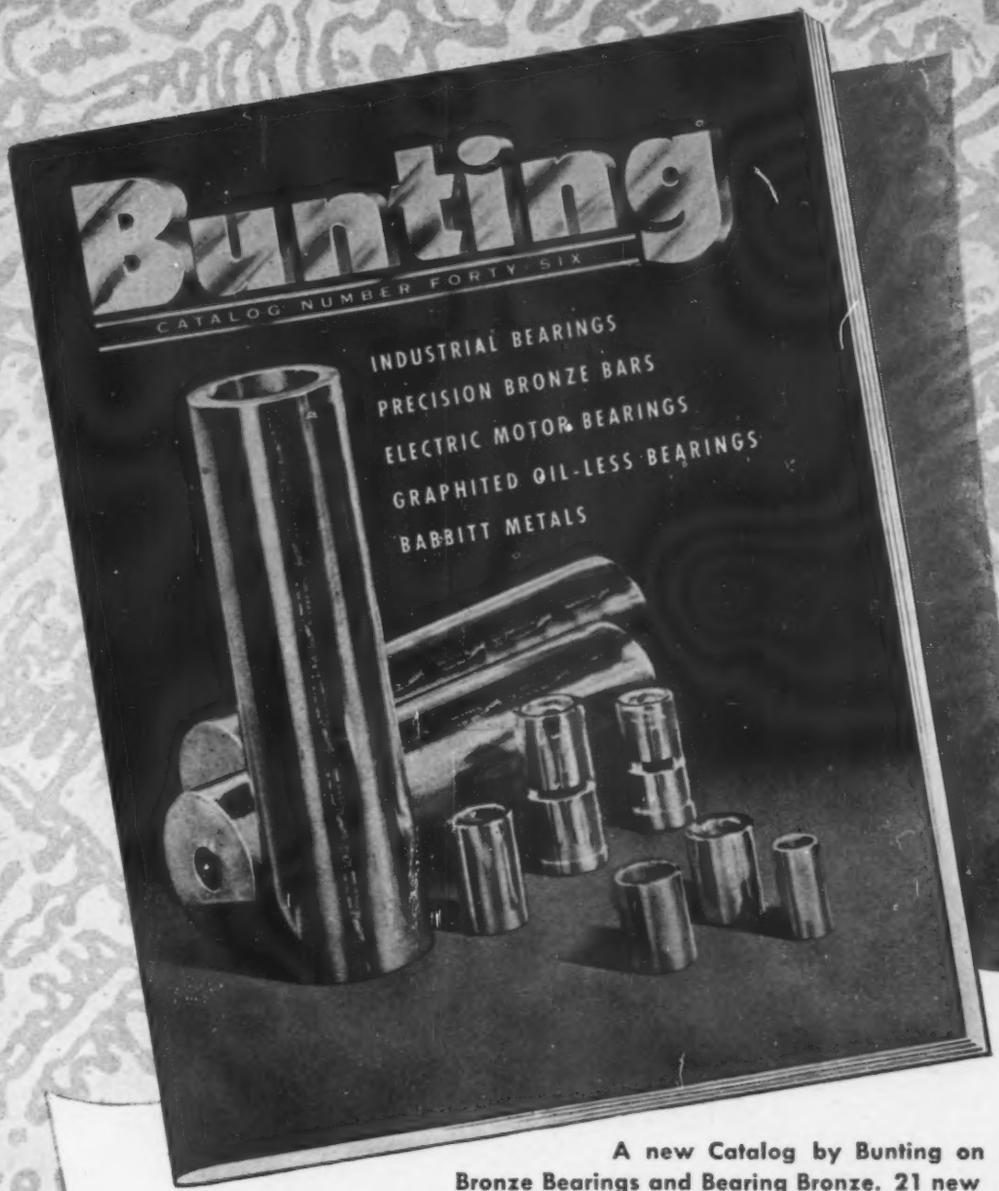
SPECIAL MACHINE mills tail-pipe flange and intake-manifold joint face on exhaust manifold. Unit has three stations with power indexing, produces 110 pieces per hr. First station: loading and unloading. Second station: tail-pipe connection milled. Third station: intake-manifold joint face milled. Second station utilizes Cross No. 101 vertical column, modified for angular feed. Third station uses same type without modifications. Carbide cutters used. Control (except clamping) by pushbutton. Made by The Cross Co., Detroit, Mich.



Sudbury Announces Five Models Of Sensitive Turret Attachment

Sudbury Mfg. Co. (formerly Sudbury Grinding Co.), Sudbury, Mass., has announced improvements in the sensitive turret attachment for use on lathes (*AM*, July 4, 1946, p. 160). Five models have been added, two of them for use on engine-lathe tailstocks. The turret or tailstock is brought close to the work and locked in position. The operator then can control the tool by using the handle of the attachment. This provides fingertip control of center drills, drills, reamers and other tools. Thus breakage of tools can be reduced.

Model 101C (illustrated) is for medium-size saddle-type turret lathes. The other models are designed to meet requirements of large and small saddle-type turret lathes, and most sizes of ram-type turret lathes and engine lathes.



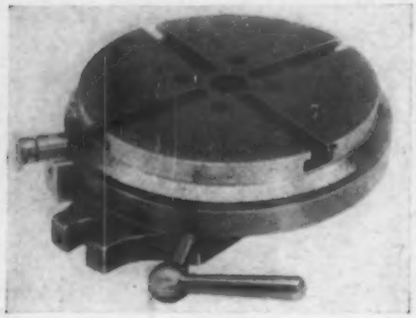
A new Catalog by Bunting on Bronze Bearings and Bearing Bronze. 21 new Bar sizes; 76 new Standard Stock Bearings; 36 new Electric Motor Bearings. Also, published for the first time, technical information covering machining, press fits, grooving, installation—an aid to engineers, designers, master mechanics, tool and production engineers. Ask for Catalog 46. The Bunting Brass & Bronze Company, Toledo 9, Ohio. Branches in principal cities.

Bunting

BRONZE BEARINGS ★ BUSHINGS ★ PRECISION BRONZE BARS

70

Preis 5-in. Rotary Worktable Made for Small Machine Tools



A 5-in. dia. rotary worktable for engraving machines and small machine tools is available from H. P. Preis Engraving Machine Co., 157 Summit St., Newark 4, N. J. The outer rim is marked in degrees and numbered each ten degrees. Each degree is notched for accurate division when engaging the index unit. The index unit can be disengaged for free turning, using a cam lock to secure the turntable.

The working surface has four T-slots for ¼-in. bolts and a ⅝-in. hole for centering work with a stud. Height is 1¾ in. and weight is 9 lb.

Progressive Press-Type Welders Do Spot and Projection Work

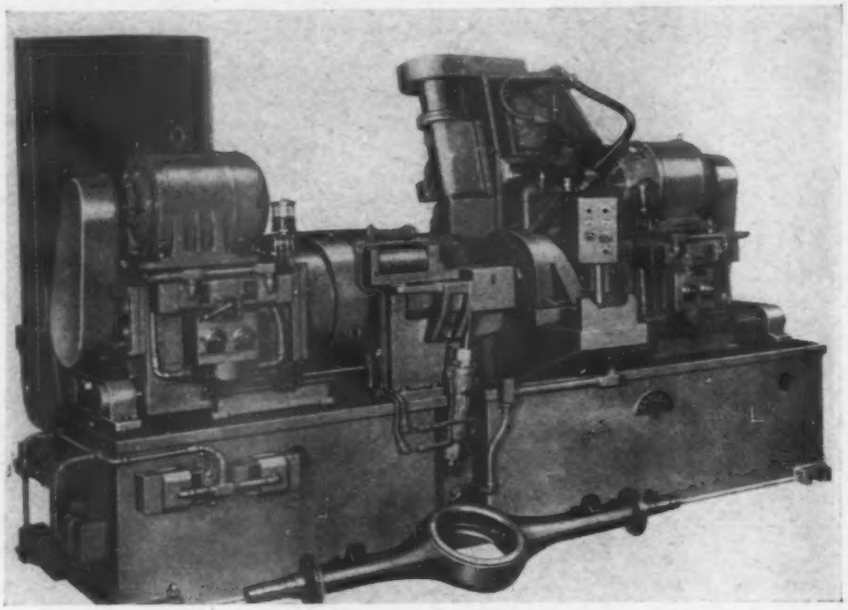
A line of improved roller-head, press-type spot and projection welders is announced by Progressive Welder Co., 3050 E. Outer Dr., Detroit 12, Mich. Capacities range from 50 to 500 kva., and the machines are designed for both continuous production and various sizes of work on a job-lot basis. Knees, welding arms, platens, electrode holders and other parts are arranged for rapid change-over for miscellaneous work.

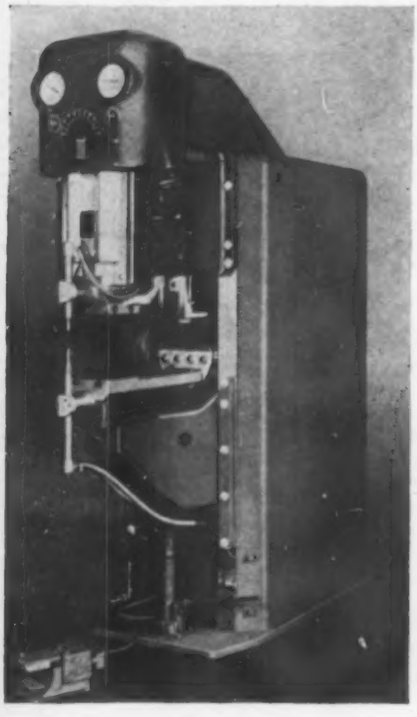
The units can be arranged for pulsation welding and resistance upsetting and brazing. It is possible to do pre-heating, post-heating and tempering of the work.

The front section of the frame is designed to take all high stresses, and it supports all heavy components. The rear section is a lightweight removable sheet-metal enclosure, making the interior accessible for changes on controls.

The low-inertia anti-friction welding head provides high operating speeds. Rollers are on the ram rather than on the guides to decrease the tendency towards deflection on long strokes.

All sizes to 250 kva. are either air or hydraulically operated. Hydraulic operation is standard on the larger units. Throat depth is 18, 24 or 30 in. for projection welding, and 18 to 36 in. for spot welding. Size No. 1 machines (50 and 75 kva.) are offered in two styles: spot and projection welder. Each can be converted to the other style. Units from 100 to 250 kva. are offered as combination machines.





Entire work cycle proceeds automatically after starting, requiring no special operator skill

Snyder Special Automatic Machine Drills 21 Holes in Axle Housings

A special automatic machine for drilling truck rear-axle housings has been developed by Snyder Tool & Engineering Co., 3400 E. Lafayette Ave., Detroit, Mich. In a 15-sec. cycle it clamps, drills 21 holes and releases the work.

Operating in automatic sequence, a movable bushing plate and two individually actuated hydraulic clamps locate and clamp the work in the fixture. Parts are engaged on the two banjo faces by two opposed pilot diameters which enter the banjo-face bores. One diameter is stationary, while the other pilot diameter is movable and is wedge-locked in place by a separate cylinder after entering the banjo-face bore.

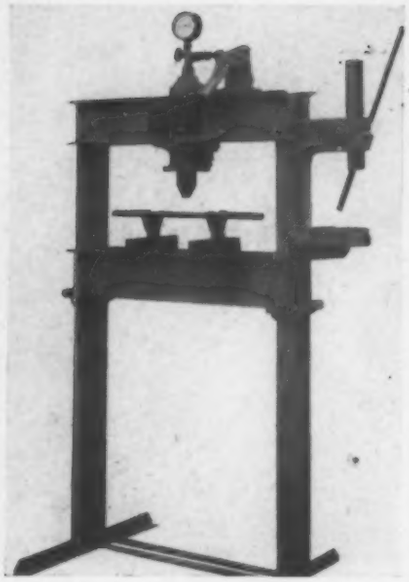
Two self-contained hydraulic units with ten-spindle heads are mounted opposite each other. They drill 20 holes in the banjo faces. A single-spindle unit mounted on an inclined angle behind one of the self-contained units drills the breather hole. It is hydraulically actuated to and from working position so that parts may be loaded.

Drills operate at 60 sfm. and feed 0.008 in. per rev. The hydraulic feed provides rapid advance to working position, working feed, and rapid return. Coolant equipment, hydraulic tank, pump and motor are enclosed in the welded-steel base.

The size accuracy, surface finish and improved physical properties of Cold Finished flats make them applicable for many uses without extensive machining. They are economically made into slides for machine tools, parts for jigs and fixtures and molds for rubber and plastic. J&L Cold Finished flats are available in a variety of grades—in sizes from 6″ to 15″ from your nearest J&L Warehouse or distributor.

JONES & LAUGHLIN STEEL CORPORATION

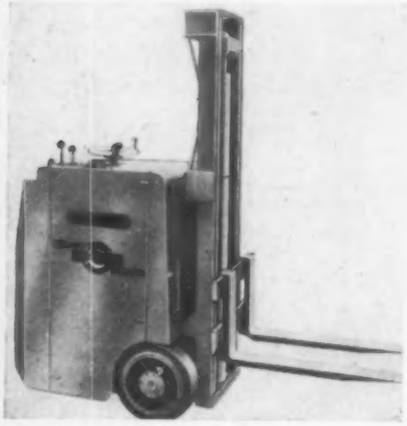
PITTSBURGH 30, PENNSYLVANIA



Manco 25-Ton Hydraulic Press Hand-Operated, Self-Contained

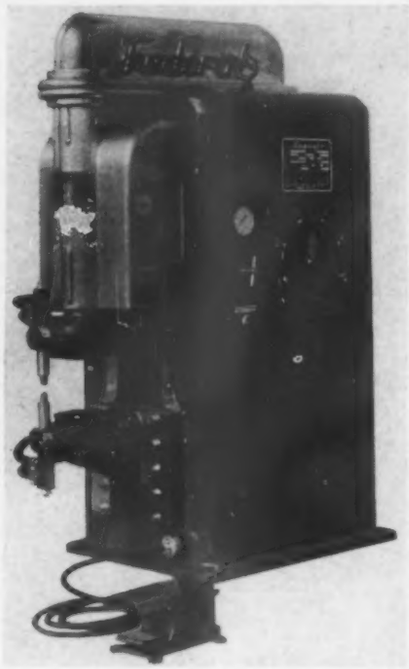
A hand-operated 25-ton hydraulic press has been announced by Manco Products Co., State & Hay Sts., York, Pa. It is self-contained and may be moved about at will. Assembling, pressing, bending, broaching and other operations can be performed.

Distance between uprights on the unit is 30 in. Ram travel is 4½ in., with ⅛-in. travel per stroke. Table travel is 35 in. The table is supported by two alloy-steel pins which rest in four inverted V-bearings. Standard equipment includes two steel parallel bars, two malleable V-blocks, one malleable ram nose and one pump handle.



Crescent Electric Palletier Operates in Narrow Aisles

The Model LVGH-X Palletier has been announced by Crescent Truck Co., Lebanon, Pa. An electric fork-lift truck, it can stack 42x52-in. pallet loads at a right angle in 8-ft. aisles. Capacity is 2000 lb. with 36-in. length of load, and 1750 lb. with 42-in. load. One man lifts, hauls and tiers from standing position with controls at fingertip. Operation is said to be free of fumes, while a full-magnetic contactor control protects against forced acceleration. Lift is hydraulic.



Spot and Projection Welding Done on Federal's Bench Unit

A bench-type combination spot and projection welder has been added to the line of The Federal Machine and Welder Co., 1 Dana St., Warren, Ohio. A general-purpose, air-operated unit, it will weld mild steel, stainless steel, aluminum and other metals. The unit has several improvements over previous designs.

A special low-inertia rubber head with micro-switch firing is incorporated. Horns, water-cooled point holders and the vertically adjustable lower knee are standard. A 30-kva. transformer in the frame has six steps of heat regulation controlled by the tap switch arrangement. Pedal operation leaves the operator's hands free to handle the work.

Stroke of the unit is 2½ in. It is actuated by an air-operated double-acting cylinder. Throat depth from machine face to center line of electrodes is 6 in.; from face to center of platens is 4½ in. The unit illustrated has T-slot platens which are optional equipment.

Torit No. 122 Dust Collector Develops 1500-cfm. Suction

The No. 122 self-contained dust collector has been announced by Torit Mfg. Co., Walnut & Exchange Sts., St. Paul 2, Minn. Largest of the Torit line, the unit is 9 ft. 7 in. high, 62¼ in. wide and 26 in. deep. Suction is through a 7-in. inlet, developing 1500 cfm. with an air velocity of approximately 6000 fpm.

There are 30 filters with a total filter area of 300 sq. ft. Exhaust air is discharged through the top or through the back panel if desired. Inlet holes are cut in each side and in the back, and the two inlets which are not used are covered. Incoming air is deflected to a hopper beneath the filters so that heavy particles are deposited first, while the lighter particles move on to the cloth filters.

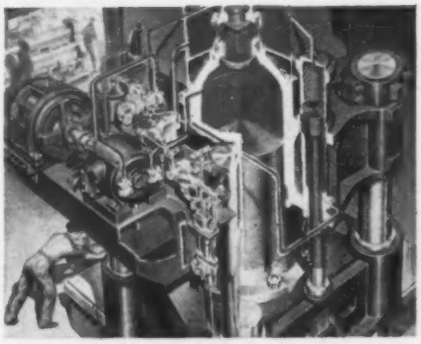
Wheel-Dressing Attachment Rotates Diamond Uniformly

The Diamond-Miser, a device designed to provide uniform wheel dressing, has been developed by Diamond-Detroit, Inc., Detroit, Mich. It is said to hold the diamond tool against the wheel in such a way as to give uniform rotation to the diamond and cause a new face to be presented to the wheel with each pass. By maintaining proper shape of the diamond, a flat cannot develop. The device is also said to permit the use of smaller stones.

The Diamond-Miser is made in three models: DMC2 (illustrated) rotates the diamond tool by means of cog wheel and trip; DMN1 provides hand indexing in front; and DMB51 has an indexing disk in the rear.

This Man Prescribes the Right "Medicines" to keep Machines "Healthy"

A SPECIALIST in preventive maintenance, your Socony-Vacuum Sales Engineer prescribes the right oil or grease for every machine you operate. Called into your plant, he studies your problems and then sets up a *complete lubrication program*. He is assisted by one of the most experienced groups of lubrication engineers in the petroleum industry.

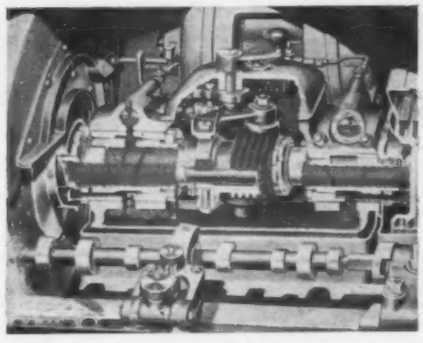


Checks "Blood" Pressure Here

Familiar with all the newest machines, like this giant hydraulic press, this specialist knows the pressures involved. He recommends a special hydraulic oil to transmit these pressures to produce smooth and positive action.

Meets a Close Call Here

"Zero clearances," in precision grinders like the one below, create a special lubrication problem. Your Socony-Vacuum engineer meets this close call with an oil designed to lubricate with microscopically thin films.



Beats High Temperatures

Terrific heat is a problem in many machines. It thins the oil and speeds oxidation. In this Diesel your Socony-Vacuum engineer combats high temperatures with special Diesel oils.

The Inside Track to Profits . . .

Socony-Vacuum Correct Lubrication

SOCONY-VACUUM

GARGOYLE Lubricants

SOCONY-VACUUM OIL COMPANY, INC., and Affiliates: Magnolia Petroleum Company, General Petroleum Corporation

Moore Locating Microscope Reverts Image to Upright

Moore Special Tool Co., Inc., Bridgeport, Conn., has developed a locating microscope to pick up edges, contours, irregular shapes and holes too small for an edge finder or indicator. The operator sees the work in its original position (not inverted or reversed).

The reticle contains a double pair of cross lines spaced 0.001 in. apart and a number of broken concentric circles. Magnification is 40×, and the field of vision permits ¼ in. of the work to be seen at one time.

The microscope is designed for use in the Moore jig borer or jig grinder. It is substituted for cutting tools or grinding heads so that work can be checked without changing setup. With suitable shank or adapter it can be attached to any machine or inspection tool requiring an optical pick-up device.

Van Keuren Microgage Line Made with Larger Diameters

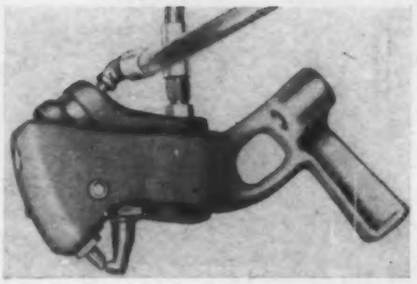
An improvement has been annouced in the line of microgages made by The Van Keuren Co., 176 Waltham St., Watertown, Mass. The gages, which are precision gage blocks of round cross-section, have been increased in size from 11/16- to ⅞-in. dia. This produces 60% more wearing surface and wringing quality. The microgages are available in sets of 5, 7, 16 and 35 blocks. The 35-block set illustrated gives combinations in ten thousandths from 0.300 to over 14 in., and includes a 6-in. block.

Press-Rite 30-Ton Punch Press Has Single-Stroke Attachment

A 30-ton open-back inclinable punch press has been added to the line of Sales Service Machine Tool Co., Inc., 2363 University Ave., St. Paul 4, Minn. Similar to other sizes in the Press-Rite line, the new unit is known as No. 3-30 Ton. A new-type clutch is a steel driving plate said to have sufficient engaging points to speed up clutch engagement and eliminate the time taken by the clutch dog to engage the clutch driver plate. Die space on the press has been increased.

A single-stroke attachment is provided for intricate work. If it is preferable to run the press continuously by depressing the pedal, a cam on the trip rod can be changed in a 10-sec. operation.

Other features include: special inclining attachment, large bolster areas, special connecting rod to positively lock the adjusting screw on the rod, flywheel belt guard, and ram ways which can be adjusted with a dial indicator when precision work is required. Standard stroke is 2½ in., and bolster area is 13¾ x22½ in.

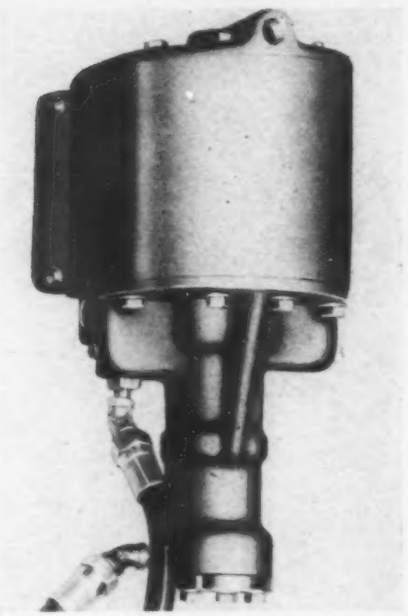


The gun is completely hydraulically operated and uses no springs

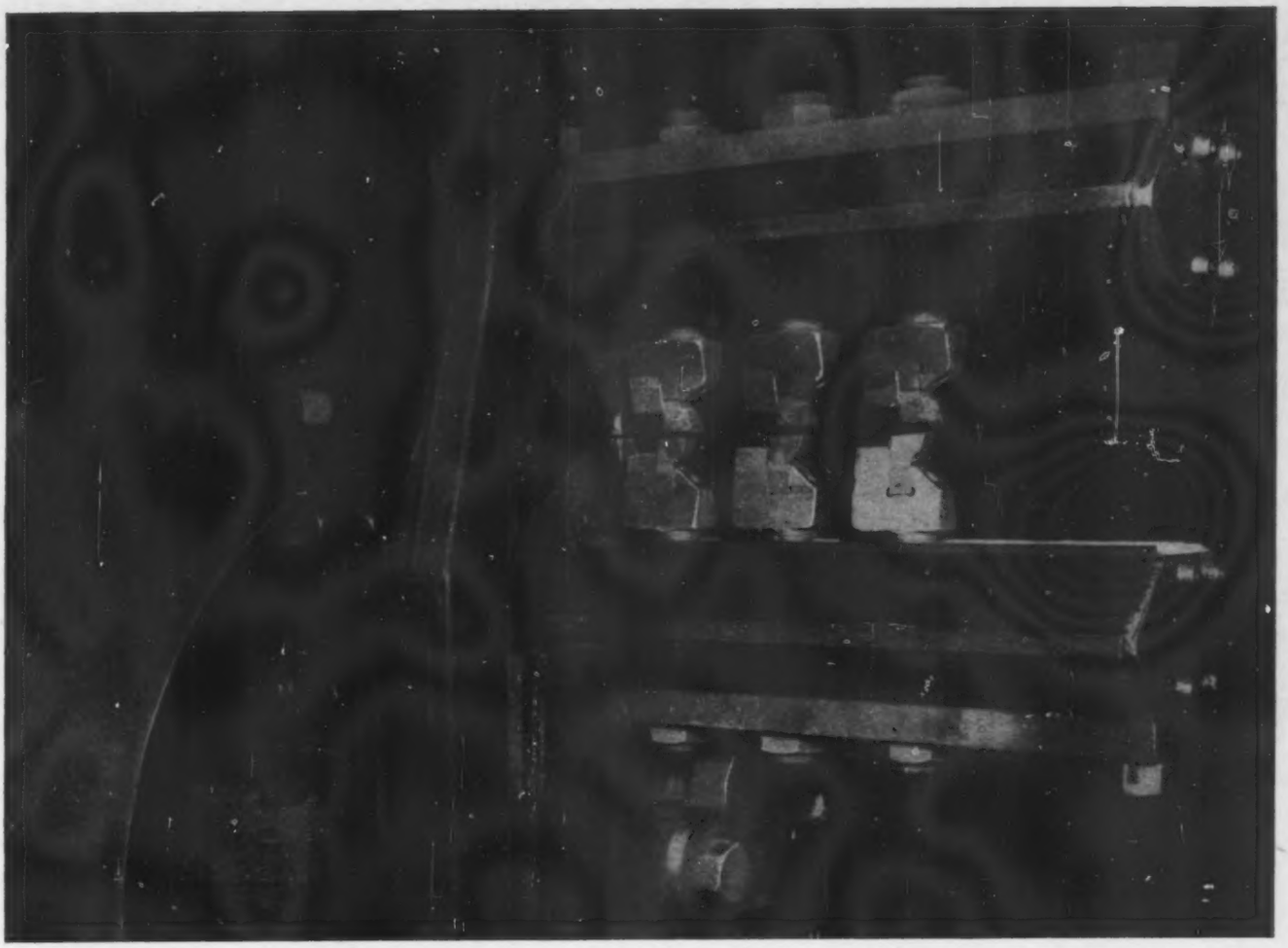
Dalhart Welding Gun and Booster Provides Uniform Weld Pressure

A hydraulically operated double-acting welding gun and booster is announced by Dalhart Engineering & Mfg. Co., 14287 E. Jefferson, Detroit 15, Mich. The design provides uniform hydraulic pressure at point of weld and is said to eliminate destructive burning or pitting by reducing the arc to a minimum. This would virtually eliminate flash or sparks and utilize transformer heat to the fullest extent.

Speed of the gun is limited only by the speed by which a solenoid air valve can be operated. Life of welding points (at 3000 spots per hr.) is 108,800 spots. The gun may be attached to a bench or pedestal to become a foot-controlled stationary unit. Welding-point pressure can be controlled by varying air pressure on the booster inlet.



Diameter of both air and hydraulic pistons in the booster can be varied to suit gun stroke



Cutting knives of Bethlehem Special High Speed on hydraulic stripping machine used for smoothing welds on oil drums.

PLANING 50,000 WELDS

WITH ONE SET OF KNIVES

With a single stroke this hydraulic stripping machine removes the weld-ridges from both the inside and outside of resistance-welded oil drums. This efficient planing job is done by three pairs of knives mounted in tandem. The first pair chips off the hard oxidized surface of the weld, the second makes a hogging cut, and the third pair makes the finishing cut. One quick operation leaves the weld smooth, and flush with the adjacent surface.

Rheem Manufacturing Company, South Gate, Calif., finishes 50,000 drums in 25 days with one set of stripping knives. These knives, made of Bethlehem Special High Speed, require sharpening only once a day. Formerly Rheem found it necessary to use from three to six sets of knives during a single day's production of 2000 drums.

Bethlehem Special High Speed is the popular 18-4-1 analysis with excellent red-hardness and high resistance to abrasion and shock. It's a real money-saver for the usual types of rough-cutting machine tools, a wide variety of special cutting tools and special dies for both hot and cold work.

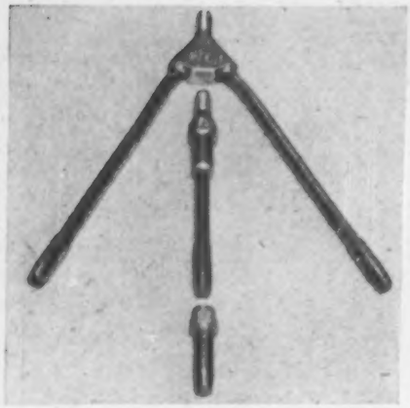
What's *your* cutting job? The nearest distributor or Bethlehem district office can give you full facts on Bethlehem Special High Speed and other quality tool steels.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

★ BETHLEHEM STEEL ★

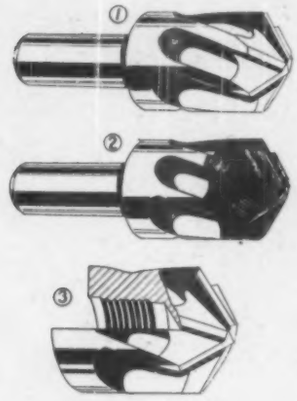
Bethlehem Special High Speed Tool Steel



Three Airco Multiflame Tips Perform Brazing Operations

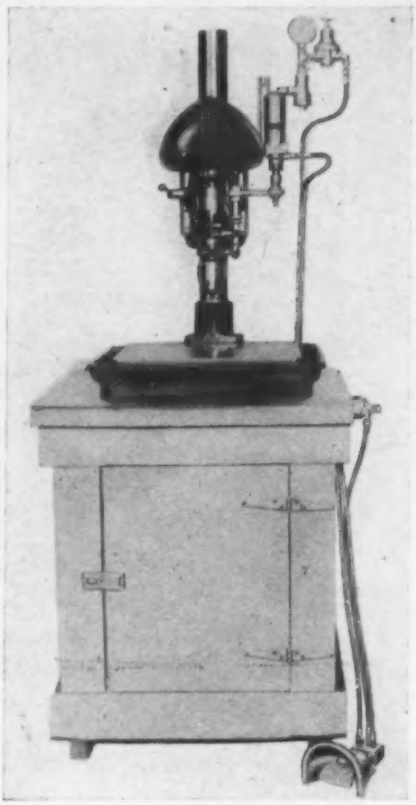
Three multiflame brazing tips have been added to the line of Air Reduction Sales Co., 60 E. 42nd St., New York 17, N. Y. They are designed for use in silver brazing, high-temperature brazing and application of hard-facing alloys. They will operate with gas combinations such as oxyacetylene, oxyhydrogen, oxy-city or-natural gas. They also have applications where aluminum and copper are used.

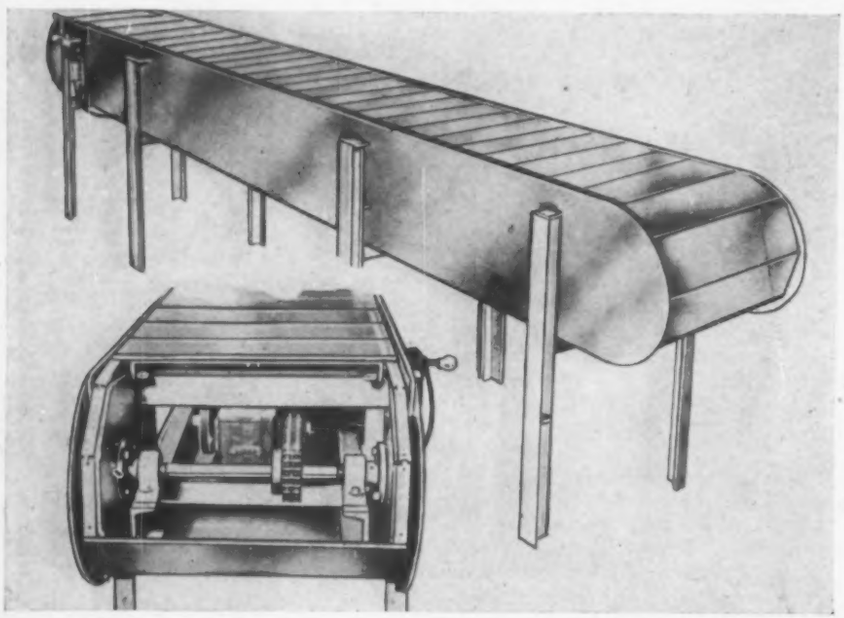
Style 721 is a light, compact tip brazed to a short, flexible copper extension, and it is available in four sizes. Style 722 is a dual-tube tip brazed to a flexible copper extension, and it comes in two sizes. Style 723 is designed for applications where the operator is farther away from his work. The tip is the same as on Styles 721 and 722, but it is used with a standard 10-in. flexible extension tube.



Three Chatterless Countersinks Added to Line of Severance Tool

Three additions have been made to the line of chatterless countersinks manufactured by Severance Tool Industries, Inc., 726 Iowa Ave., Saginaw, Mich. One: Chatterless countersinks having a 60° angle with the center line are now standard in nine sizes to 1-in. dia. Two: standard chatterless countersinks are now made in cemented carbide in sizes to 1½-in. dia. They have the same standard angles as Severance's High Speed countersinks. Three: countersinks with threaded bodies have been added in sizes of 1-in. dia. and larger. Prices and body dimensions are the same as for standard Chatterless countersinks with integral shanks. The threaded-body countersinks can mount directly to the user's adapters or to Severance's tapered- and straight-shank adapters or arbors.





CONVEYOR operates at any speed to 100 fpm., has capacity of 250 psf. Known as Mercury All Aluminum conveyor, it is distributed by Patron Transmission Co., 129 Grand St., New York 13. It is shipped prefabricated in 5-ft. sections. Widths are 6 to 60 in. height is 15-in. up. Belt supported by phenolic rollers (8 per ft.) Standard equipment includes speed reducer, electric reversing control

Drillpresses Made Pneumatic With Pre-Engineered Equipment

Pneumatic operating equipment for installation on drillpresses has been announced by National Pneumatic Co., Rahway, N. J. Supplied in the form of a kit (No. DC-40730), it is designed to quickly convert spindles to air-powered operation.

The kit consists of operating assembly (including air engine, pressure gage, pressure regulator, exhaust valve and cushioning plug), foot-operated control valve, air strainer, cut-out cock and flexible hose. The engine is mounted on a bracket which is attached to the drillpress frame. It is said to provide controlled air power which can be adjusted to suit any drill size or stock and to permit maximum pressure and speed within safe limits. The illustration shows a typical installation on a bench-model drillpress. The hit is pre-engineered for easy installation.

... consider aluminum extrusions

From decorative trim to structural members Reynolds Aluminum extruded shapes offer outstanding advantages.

Strong aluminum alloys, less than half the weight of steel, give a highly favorable strength-weight factor for such applications as airplanes, windows, molding, and furniture.

Extruded in a single operation, "building up" is completely eliminated, cutting costly time and labor charges.

Reynolds Aluminum Extruded Shapes are rustproof . . . strong . . . light. Many stock dies are available. Costs for special dies are low. Consult Reynolds engineers on adapting Reynolds Aluminum Extruded Shapes to your needs. Write Reynolds Metals Co., 2523 So. 3rd St., Louisville 1, Ky.

Among the many current uses for Reynolds Aluminum Extruded Shapes are:

Windows	Busses
Irrigation Pipe	Garden Tools
Furniture	Store Fronts
Aircraft	Refrigeration
Textile Machinery	Railway Cars
Truck and Trailer Bodies	

REYNOLDS METALS

REYNOLDS
THE GREAT NEW SOURCE OF **ALUMINUM**

2978

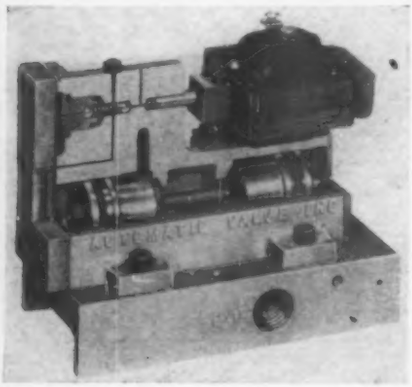
INGOT · SHEET · SHAPES · WIRE · ROD · BAR · TUBING · PARTS · FORGINGS · CASTINGS · FOIL · POWDER

Parts and Materials

Coiled, Flat Aluminum Sheet Embossed by Reynolds Metals

Coiled and flat embossed aluminum sheet is now available from Aluminum Sales Div., Reynolds Metals Co., 2500 S. 3rd St., Louisville 1, Ky. Two patterns are offered at present: "ribs" (approximately ⅛ in. wide) lengthwise or crosswise on the sheet, and "stucco," an irregular, distorted pattern. Other patterns which will be available shortly include: a non-directional pattern of "squares"; and diamonds arranged lengthwise on the sheet.

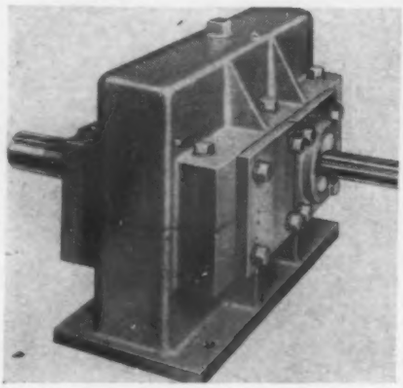
Present facilities of the company will handle flat sheet from 0.010 to 0.032 in. thick, and coiled sheet from 0.010 to 0.020 in. thick. Maximum width is 27 in. Wider sheet (up to 84 in.) and other thicknesses will be available later.



Three-Way, Three-Port Air Valve Controls Single-Action Cylinders

A three-way, three-port, solenoid-operated air valve has been announced by Automatic Valve, Inc., 37415 Grand River, Farmington, Mich. Known as SV-3, it is designed to control single-action air cylinders actuating machine-tool operations. It is lightweight and compact so that it can be attached close to air cylinders, and it mounts in any position.

The SV-3 is normally open or closed. It is a balanced-piston type, valve-pressure sealed and reversible. Made in ¼, ⅜, ½ and ¾ in. sizes, it has no metal contacts. It uses O-ring type seals. Valves operate on pressures from 5 to 150 psi.



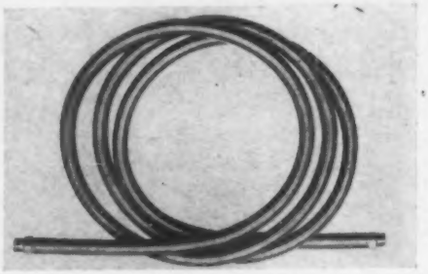
Olson Single-Reduction Units Reduce Speed by Helical Gear

Helical-gear speed reducers have been announced by Olson Industrial Products, Inc., 821 Washington St., Lynn 10, Mass. They are single-reduction units made in four size groups, and each group has seven units with ratios from 2:1 to 9:1. With 1750-rpm. input speed, the hp. of the smallest group is from 3.38 to 5.60, with output speed from 207 to 660 rpm. At the same input speed, the hp. of the largest group is from 13.60 to 20.70, with output speed from 203 to 660 rpm.

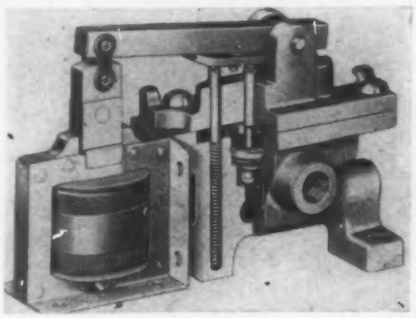
Source of power can be electric motor, steam turbine, or gas or steam engine. A motor can be mounted on the top of a unit by means of special support. Timken oversize Anti-friction roller bearings are incorporated, and teeth have 20° pressure-angle stub tooth form for maximum load-carrying capacity. Assembly can be either right or left hand.

Floating-Seal Metallic Packing Developed by Rodpak Mfg. Co.

An improved floating-seal metallic packing is available from Rodpak Mfg. Co., San Francisco, Calif. Said to eliminate leakage completely without reducing the flexibility of the original unit, it can be used for both rod- and plunger-type applications, and for all types of compressors. The packing will hold 1500-psi. hydraulic pressure with one unit made up of two metal rings and a new-type synthetic ring. The old type required three units.



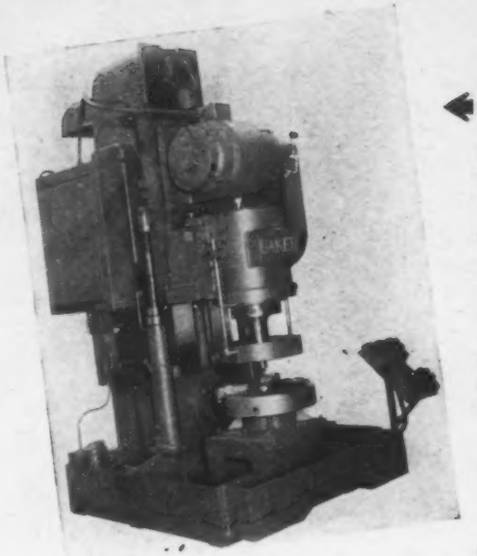
FLEXIBLE CONDUCTOR for transmission of high-power, high-frequency current. Made by Titeflex, Inc., 500 Frelinghuysen Ave., Newark 5, N. J. It is water-cooled for minimum losses. Conductor consists of brass, watertight convoluted inner core with an outer braid conductor. Specially compounded insulation is extruded over outer braid. Power losses are said to be less than conventional ¼-in. copper-tube conductor



Crescent Four-Way Air Valve Takes Pressures to 140 psi.

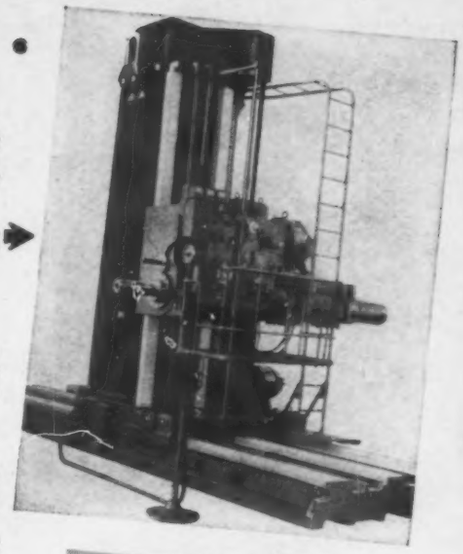
A fast-acting four-way air valve has been announced by Crescent Valve Co., 6073 State St., Huntington Park, Calif. It incorporates stainless-steel balls travelling between opposed, closely aligned brass seats. It is lever actuated, spring biased, solenoid operated and can be operated continuously.

The valve is made in ¼-in. size, but because of high output, it is said to be able to substitute for many ⅜-in. valves. Dimensions are 2x6x4 in., and weight is 5 lb. with cover. It is recommended for pressures to 140 psi. and may be converted to a three-way valve by plugging one hole. It is also available for hand, foot, or cam operation.



BAKER BROTHERS 40 HP BORING & DRILLING MACHINE. Booth No. 639

Cone-Drive to the spindle "gives powerful but smooth transfer of power" to the CARBIDE tipped multiple blade cutter head.

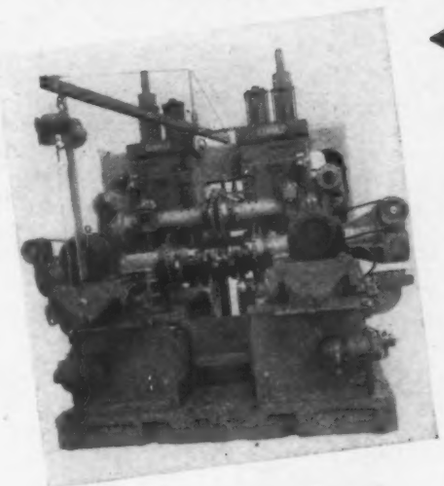


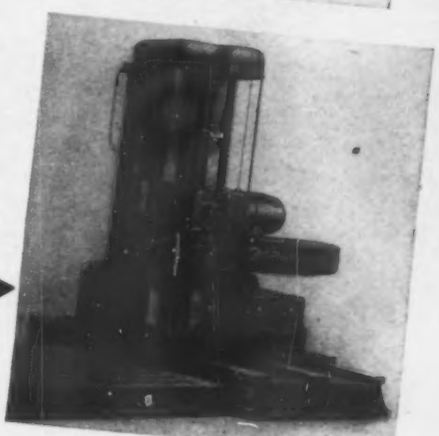
GIDDINGS & LEWIS MACHINE TOOL CO.'S BORING, DRILLING & MILLING MACHINE. Booth No. 315

Cone-Drives are used on this as well as other G & L machines for smooth, accurate transfer of power in less space than otherwise possible.

GISHOLT MACHINE COMPANY'S 50-TON 180-HP TURN MILL. Booth No. 304

Roughs all rod bearings on a crankshaft from the forging every 2 minutes. The six 24" OD—78 rpm cutters are individually driven from 25 hp motors through 25:1, 10" C.D. Cone-Drives at 445 SFPM. This drive not only transmits high power smoothly but saves considerable space. Two 4" and two 5" C.D. (No. 7415) Cone-Drives rotate the work spindle smoothly at 1 rpm. The 5" Cone-Drives are driven by 2 pinions, one on each side of the gear, arranged so as to eliminate backlash.





G. A. GRAY CO.'S 36 TON HORIZONTAL BORING, DRILLING & MILLING MACHINE. Booth No. 501

7½" C.D. Cone-Drives feed the column smoothly along the runway at ½" to 120" per minute to a micro-jogging accuracy of 0.00025". Gears are self-locking for climb milling conditions, make for compactness by saving space.

MICHIGAN TOOL'S NEW "3-WAY" UNDERPASS GEAR FINISHER. Booth No. 426

Faster gear finishing by *any* of 3 methods (selected at will) plus of course real smoothness and accuracy through Cone-Drives to the high speed cutters.

SHEFFIELD CORPORATION'S GEAR CHAMFERING MACHINES. Booth No. 202

With Cone-Drive geared heads "for greater accuracy, less chance of backlash, more tooth-to-tooth contact and higher gear strength."

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plus numerous other new Cone-Drive operated machines (photos not available at press time).

CONE-DRIVE

CONE-DRIVE DIVISION

MICHIGAN TOOL COMPANY
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get the RIGHT START when PERKINS GEARS "appear in the picture"!

● During the war, Perkins High-Precision Gears contributed to a considerable extent towards the superiority of America's military aircraft. While in the production of planes, the emphasis is now on transportation, many airplane engine manufacturers continue to depend on Perkins Gears for smooth, trouble-free power transmission.

● Our production equipment comprises modern machine tools, and our facilities are ample to meet practically any demands for the mass production and prompt delivery of precision gears. Once your specifications are in our files, reorders are filled automatically.

YOU FURNISH THE SPECIFICATIONS • WE'LL PRODUCE THE GEARS

PERKINS precision, custom-cut GEARS

Perkins Makes—in all materials, metallic & non-metallic
Helical Gears, Bevel Gears, Ratchets, Worm Gears, Spiral Gears, Spur Gears, Ground Thread Worms

PERKINS MACHINE & GEAR CO. • SPRINGFIELD 2, MASS.

ROUND TABLE Discussion

GOLDBERGING OR GOLDBRICKING?

Suggestion systems in many states, I have found, are obsolete particularly in small- and medium-size concerns, where they should be more successful.

There is more scope for useful suggestions in the small plant because there is not the diversified type of equipment that is to be found in large concerns. This should provide a greater field for a workman's ingenuity.

Decline of the suggestion system in the U.S.A. is due in part to the fact that trade union officials and shop stewards are hostile to the system. Despite the fact that ingenious officials have apparently investigated every angle for time- and material-saving methods, from time to time some workman comes up with an idea that knocks all earlier ideas into a cocked hat and revolutionizes a particular process. These instances are comparatively rare, but they do occur.

Another reason that suggestion boxes are not successful is that the majority of employees find it difficult to make sketches and write descriptions indicating what their suggestion really is; thus lots of them are never made.

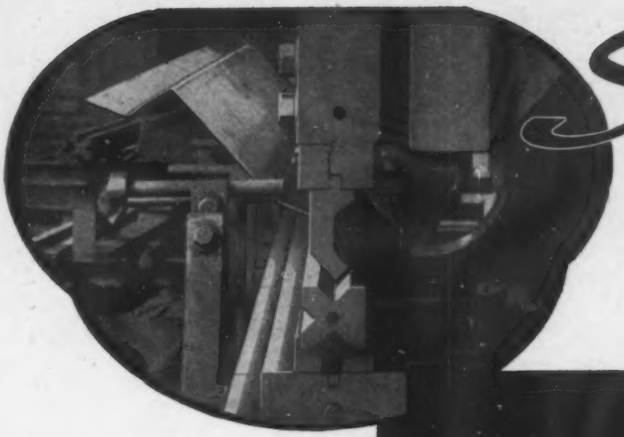
One large concern, upon discontinuing the suggestion box, sent a letter to its employees stating that anyone who had a worthwhile idea could request the help of a draftsman, at no cost, to make up a blueprint of the suggestion. The response was good and a number of worthwhile suggestions resulted.

Arthur Silvester
Niantic, Conn.

•

Several years ago a prominent manufacturer installed suggestion boxes in all departments and invited employees to drop in ideas for improvements, stating that collections would be made from the boxes at the end of each week. The donor was to be notified by the suggestion committee whether his idea was accepted or rejected and, if accepted, would be paid in proportion to the value of the suggestion.

One of the workmen placed a suggestion in one of the boxes and in due time received a note from the suggestion committee stating that the



Serves

WHITEHEAD & KALES FOR *NEARLY EVERY* FORMING OPERATION

The photographs show the production of parts for car-hauling trailers. Front and back stops make it easy to produce the several bends in each plate accurately and quickly.

This Steelweld handles 12' x 3/8" steel plates between housings and 14' x 5/16" over entire length of bed and ram.

For six years a Model K5-12 Steelweld Press has been in continuous operation at the Whitehead & Kales Co., River Rouge, Mich., for nearly every type of forming operation in steel plate.

Much of the work is on plate 3/8-inch thick and heavier. Bolt holes and larger holes are frequently punched. Recently oval-shaped holes approximately 5 x 7-inch were punched in 1/4-inch plate. Hundreds of special conduit boxes made of 14 gauge steel have been produced to tolerance limits of .005 inch.

New ways of using the machine are continually developed as problems arise. It has proven to be one of the most generally useful all-around tools to The Whitehead & Kales Co., who specialize in automobile-hauling trailers and other structural work.

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CATALOG No. 2010 gives construction and engineering details. Profusely illustrated.

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this improved

CARLOADER

— *lower overall height 83"*
— *higher lift 120"*

Plus SUCH PRACTICAL ADVANCEMENTS AS

PIVOTED STEERING AXLE —MAXIMUM FLEXIBILITY FOR EVERY OPERATION OVER ROUGH SURFACES.

IMPROVED HYDRAULIC SYSTEM—VALVE MOUNTED DIRECTLY ON THE SUMP; NO PIPES OR FITTINGS . . .

STRONGER FRAME—BOX TYPE; 3-POINT MOUNTED—ASSURES STABILITY.

ACCESSIBILITY—ALL VITAL PARTS EASY TO REACH; COMPLETE HOOD REMOVAL.

GREATER MANEUVERABILITY —LONGER WHEEL BASE, YET NARROWER TURNING RADIUS.

The Clark Carloader changed industrial thinking about how to load and unload freight cars; it always was the champion of its class and still is.

Look to Clark Tructractor for continuous study of material handling—and for continued development of better methods for cutting handling costs.

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Division of CLARK EQUIPMENT COMPANY
BATTLE CREEK 3, MICHIGAN
OTHER PLANTS—BUCHANAN, JACKSON, BERRIEN SPRINGS, MICHIGAN
Please send literature on the new Clark "Carloader."
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suggestion was not fully acceptable.

The foreman of the department protested, stating that he believed it was a suggestion well worthwhile and that he would like to use it. After getting the superintendent's consent, he did use it and found it valuable.

Some months later the same workman placed another suggestion in the box and received another rejection notice. Again the foreman requested it be used, and this idea also proved to be of practical value.

The company eventually had a complete turnover in the suggestion committee and a large share of suggestions offered were accepted and satisfactory awards made. It is important to have men on the suggestion committee who are capable of judging values in technical matter.

Work done by employees on company time is wrong; however, most experimental work that I have observed has been worked out at the men's homes or paid for in some private shop.

John Mark May
Watervliet, N. Y.

•

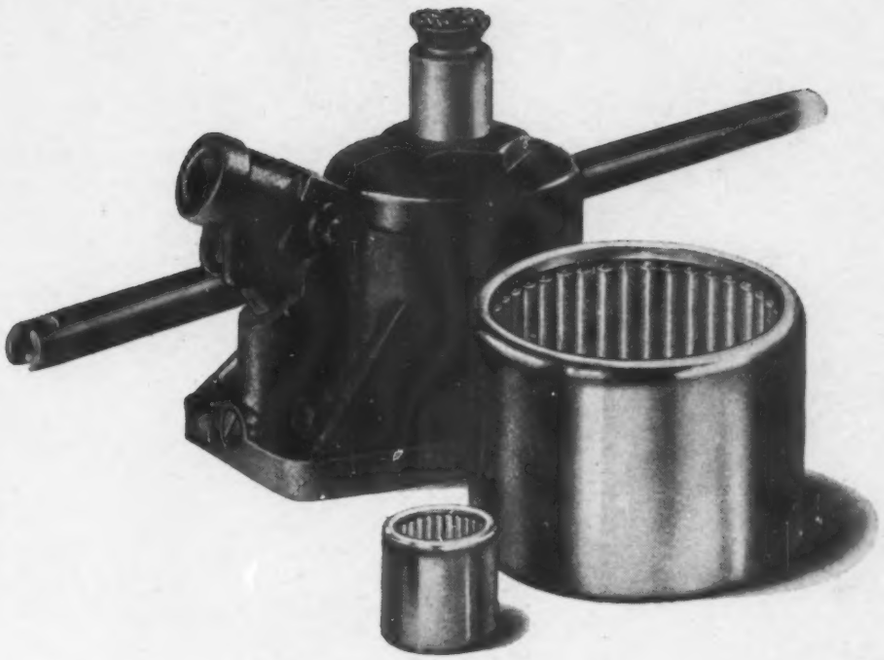
During the late war it became apparent that industry needed all possible ideas from top management down to the lowest class of workman in the plant. Through the suggestion system, millions of dollars and manhours were saved by ideas originating in the minds of men never before asked to think. The cessation of hostilities also caused a cessation of this demand.

If industry wishes to continue to reap the benefits of ideas and suggestions, the system must be reorganized. It need not be so loosely controlled that it provides a goldbricker with an alibi for killing time on the job, but should give everyone an equal chance to sell his ideas. If the suggestion system is manned by individuals who thoroughly understand the work at hand, they will be in a position to judge an idea.

Quite often it becomes a problem as to who may or may not make a legitimate suggestion. An idea may be a bonafide suggestion to one individual, while to another it will be classed as one in line of duty.

Many good suggestions made by workers may be practical from a production standpoint, but sorely lacking in some other respect, because the employee originating the suggestion does not understand certain factors involved in other stages of the work. In this event, the reasons for rejection should be fully explained.

When workers find that their sug-



It needn't be big . . .

a small hydraulic jack can lift a whale of a load. With anti-friction bearings, too, size is no rigid measure of capacity. For Torrington Needle Bearings, the most compact ever devised, are able

To carry heavier loads . . .

in proportion to their size than any other anti-friction bearing. Behind the advantages of small size and high capacity lies the principle of Needle Bearing construction . . . a full complement of small diameter precision rollers providing maximum area of bearing contact surface.

If your problem is handling heavy radial loads in minimum space, let our engineering staff help you apply Needle Bearings in your product.

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In the Glare of the Torch— think of WILLSON

Style CW60

ROOM WANTED FOR SPECTACLES? . . . There's comfort for wearers of prescription glasses in Willson Cover-Alls.* And the adjustable leather bridge rests lightly on the nose without pressure. Willson-Weld* lenses in the shade you specify, of course.

Style RW50

GAS WELDERS GO FOR IT . . . Assured protection of Willson-Weld lenses and comfortable face fit make this goggle day-in, day-out favorite for flame cutting and cleaning as well as welding. Indirect ventilating ports exclude glare.

Style DC50

FOR EYES THAT LEAD A DOUBLE LIFE . . . From welding to chipping with a flip of the wrist! Willson-Weld lenses in separate frames flip up to leave eyes protected by clear, Super-Tough* lenses.

For complete information on these products and their application, as well as many more eye and respiratory protective devices, get in touch with your nearest Willson distributor or write us direct.

*Reg. U. S. Pat. Off.

GOGGLES • RESPIRATORS • GAS MASKS • HELMETS

DOUBLE WILLSON PRODUCTS INCORPORATED

Established 1870

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gestions receive proper attention and consideration, they will not find it necessary to build models or samples on company time in order to help sell their ideas.

Foremen who are on the job in their department can do a great deal to encourage and promote the proper suggestions, if workers have confidence in him and can feel assured that they will receive due credit and remuneration.

Proper management principles, efficient committee personnel, and the proper cooperation between foremen, supervisors, and the one making the suggestion will automatically starve the Goldberging or Goldbricking system.

A. F. Scoblic
Milwaukee, Wis.

•

WHO PAYS FOR BREAKAGE?

My sympathies are with Ed in this case. If I borrow a tool, I consider myself responsible for returning it in good order, and if it is lost, damaged or stolen before I can do this, then it is up to me to compensate the owner.

While there is much to be said for many of the welfare activities of progressive business organizations, there is a danger of their being overdone, thus sapping the independence and initiative, which is an essential part of the makeup of a genuine craftsman.

Most craftsmen prefer to work with their own personal equipment for certain measuring jobs, and there is an excellent reason for this; one becomes accustomed to the 'feel' and handling of a certan tool, say a micrometer, and one gets to know it so well that one works with it faster, more accurately and with greater confidence than one would with a company provided one which was being used by a dozen other people.

Almost without exception, the true craftsman has a range of tools of his own, he looks after them and regards them as a valued personal possession. The dea that his employer has any responsibility in connection with them is not a sound one. If those tools are lent, then the borrower is responsible for them, and the only comment I have to make about John Marks is that it was a pity he stopped at the "almost" and did not take an actual and vigorous "poke" at the verminous Bill Paine.

Speaking as an employee of an extremely progressive and enlightened firm, I for one don't want them to carry me about and relieve me of

Firthaloy

compacting and sizing dies

for powdered metals ceramics abrasives and pharmaceuticals

provide

ACCURACY OF SIZE—no variance in size of product over long runs.

WEAR RESISTANCE—exceedingly long die life . . . fewer downtime delays in performance.

EXCELLENCE OF SURFACE FINISH—a particular advantage when sizing powdered metals after they have been sintered.

BETTER PRODUCTS—Firthaloy Dies eliminate the need for lubricants, which are undesirable, but often required when compacting certain pharmaceuticals on steel dies.

ECONOMICAL PRODUCTION—Unusually long, continuous runs with assured quality bring lower production costs.

Firthaloy Compacting and Sizing Dies are available in simple rounds, hexagons and squares, as well as in more complex shapes. Firthaloy tipped or solid punches required for certain types of compacting can be supplied.

Call **Firth Sterling**

STEEL & CARBIDE CORPORATION

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"THE STANDARD CARBIDE"

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all my responsibilities; I expect to be adequately paid for my service and otherwise to be regarded as a reasonably intelligent individual who can be trusted to manage his personal affairs for himself.

K. N. Harris
Harrow, Middx., England

•

ARE TOOLMAKERS OBSOLESCENT?

The trend toward sepicalization normally leads to the use of more men of lesser skills; but the continual flow of new and better equipment and tooling leads to more skilled men to keep this equipment operating at its maximum efficiency.

The toolmaker's work has been broken down, until at the present time the construction of a tool or die may be the result of the labors of many hands, resulting in a better and less-costly product.

Regarding Ed's claim that a machine operator takes longer to do a job, and scraps a lot of valuable work, this is open to debate. Other conditions being equal, a lathe hand of ten years' experience should certainly be bale to produce better and faster than a toolmaker with ten years' accumulated experience, since the lathe hand has the benefit of continuous practice in his specialty.

Yet in spite of these changes, the journeyman, toolmakers or diemakers, will always be the key men in the assembly, construction, and maintenance of the major portion of all our tools, dies, and fixtures, which are becoming more complex as our production problems become greater.

Men of mechanical ability, men who can visualize the finished article before its completion, and who can be used on any job and in any situation, are a valuable asset to any shop.

Robert Knotek
University Heights, Ohio

•

Specialization has been defined as getting to know more and more about less and less. We are getting to know more every day about production of goods and manufacturing processes to the extent that a minimum group of men cannot be expected to encompass this knowledge.

Our factory has an apprenticeship training plan which employs both veterans and ordinary young men just out of high school. Plastic products and various stamped goods are made. The toolroom makes the plastic molds, jigs, the stamping and forming dies used by the rest of the factory. Journeymen are employed, but in a specialized way. A definite policy is followed, with different scales for specialized workers. The reason—lower-cost finished tools.

'Ed' says journeymen are needed. Yes, their knowledge of different machine operations is required, especially in the foreman, but they will be employed in doing only certain classes of toolmaking.

It is also correct that specialists by operations are employed even in large tool rooms, which means lower costs, just as special machines mean lower costs, where production warrants their use.

Edward Diskavich
Torrington, Conn.

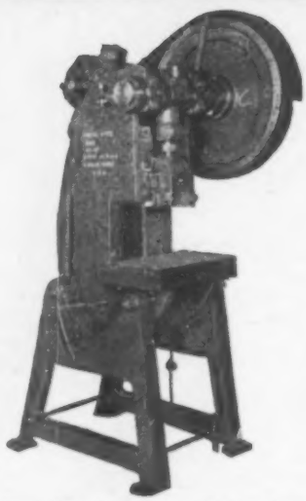
TO THE EDITOR

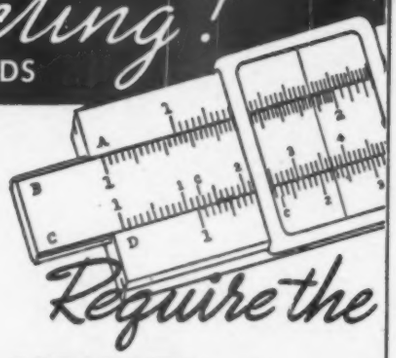
TO SCRAPE, OR NOT TO SCRAPE?

In answer to John R. Godfrey's recent remarks, I wish to say most emphatically *to scrape.* I admit what Mr. Godfrey says about auto crankshafts and similar work is true, but, assuming we were going to put a new taper bearing in the front end of a milling machine, gear hobber or such, we must get a perfect fit by scraping. We also must scrape the front bearing to bring it dead in line with the ways on which the knee travels up and down (although I did see a man lining a spindle up that was evidently too low on the bottom, by pounding it upward with an 8-lb. lead hammer. I tried that scheme myself later on and it worked. I did have to scrape afterward to get the taper bearing to show perfect contact, also to make room for a film of oil as we still have thousands of machines that do not have forced lubrication.)

Now let's take up flat and V work on machines such as planers, planer-type millers and many other machines that have sliding tables or carriages. It matters not if the planer that finished these parts is as perfect as humanly possible, there are bound to be low or high places on the machined work caused by the finishing tool, on account of the difference of the density of the metal being planed. Therefore, each part that mates with another must be scraped to a perfect fit all the way along and likewise made straight. Spotting, flaking or frosting is just as essential as it provides low spots to hold a

TODAY'S *Exacting!* PRODUCTION DEMANDS





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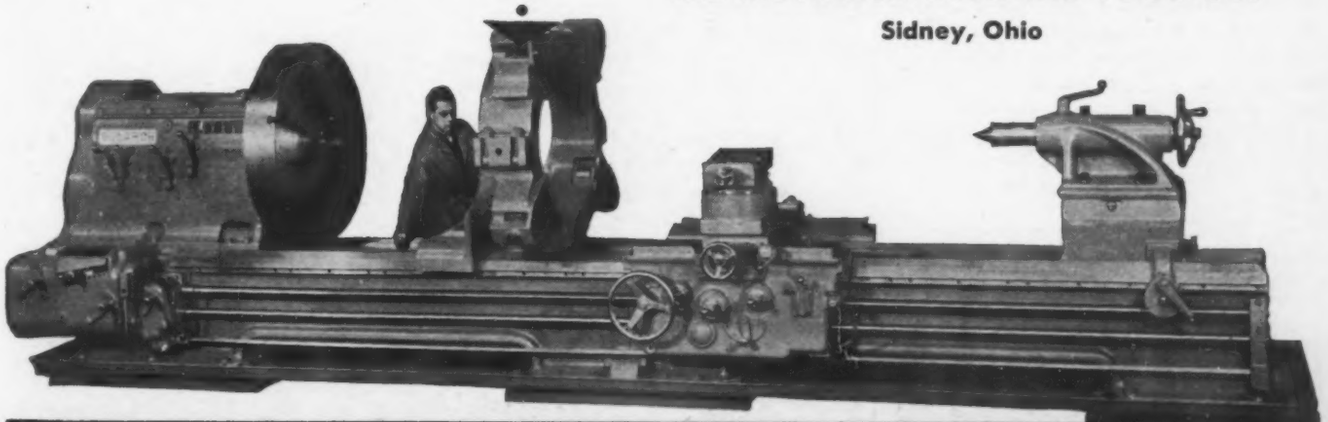

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wiping the oil off the first time it passes over. This is assuming there is no forced lubrication. It also keeps the operator of a planer, for instance, posted as to where his ways are wearing most, warning him to move his work along different parts of the platen, not putting it all in the center as is frequently done.

I have taken planers down to the floor, placed the bed on a larger planer, and found the V ways to be sometimes low in the center and sometimes low on the ends. By turning the platen upside down, I have found the V's to be worn to fit. Now if the V's and V ways on the rebuilt planer were not scraped in to one another, likewise straightened, the platen would be riding in mud instead of good clean oil. Besides, who could measure it close enough to get all four bearings to fit?

There is still another reason for scraping. We will assume the planer man is ever so careful and highly experienced and did not use clamps for drawing his work down, thereby not twisting his work on the platen, but held the work with set screwed stakes. When his job is finished, there is bound to be some distortion caused by the removal of the foundry scale and perhaps other factors.

"Old-Timer"

•

HUMAN ENGINEERING

It was with a great deal of interest that I read "Human Engineering" in June 5 *American Machinist*. We have grossly neglected human engineering as a vocation. If one were to enter the halls of learing and express a desire to be graduated as a Human Engineer, he would, no doubt, bring forth a caustic smile or supercilious bewilderment. Yet. the fundamental elements of "human engineering" should be inculcated in all students. Before one is handed his diploma he should be proficient in at least a few of its many ramifications —practical psychology, social understanding, industrial and business relations, wise use of capital, inherent rights of labor, and above all, a thorough drilling in fair play in business and industry. I would hold in abeyance, until he has gone out into the world and proven his worth, that little sheepskin.

Any man who has stood up to a machine "grinding" out the work throughout a long, monotonous day, who is confronted with such a situation as was the case with the introduction of carbides, will be expected to register opposition, either openly or stealthily. Any radical innovation should first have been called to the attention of the workers with the understanding that any increase in production would necessarily accrue to their own benefit in increased wages. This would have created cooperation in the experiment. Benefits derived by technological advancement should be shared by all concerned: Management, Labor, and Buyer.

Now about the foreman's responsibility in trimming his department to suit a new schedule forced upon him through some unforeseen condition: It is a thankless task to determine who is to stay on the job at a time of layoff. Were his shoulders broad enough to withstand the load, can one be assured that he can do the job with complete impartiality? Would not a compromise between the "Ivory Tower" and the foreman's sole judgment be worth considering? Let us say that a committee of three select who should be laid off: the foreman, a representative of the "Tower" (such as a member of the department of personnel), and a senior member of the workers in the department under consideration. Surely there cannot be any cause for complaint as to the fairness or unfairness of the selection. Incidentally, this would permit the foreman to get a good night's sleep.

I was greatly amused as I read about the operator doing more work without his eyes. My thoughts went back to the time one of my fellow workmen spoiled a good piece of work because he was emotionally, or physically, upset because a shapely stenographer happened to come within the range of his vision just as he was setting the boring tool for the finishing cut.

It may be all right for the Big Boss to invite anyone into his office to discuss what might prey on his mind; however, it has always been a policy of mine not to go over anyone's head. I've seen the practice almost wreck a department in which I worked only recently. Better change your sign, Big Boss, to read: "Come in to have a drink any time, but tell your troubles to your immediate superior."

The idea of having a thorough physical examination upon one's entering a plant for the first time is fine. How about going a little farther and examine for emotional efficiency—the power to get along with the fellow workers? Assuming that the health of the applicant is good, what is there to determine what it is after he has been on the job for a while?

It was a revelation of magnanimity

"Phillips Screws Stopped Costly Damage by Slipping Drivers"

says COLUMBUS SHOW CASE CO.

Right — No place for a driver to slip out of a screw head and run wild . . . and it doesn't with Phillips Screws.

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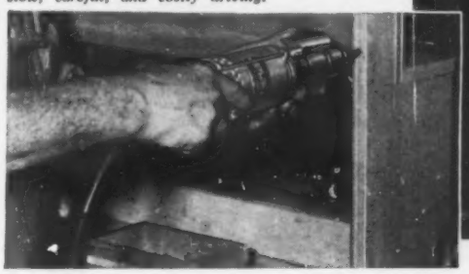

Excerpts from another of the series of independent surveys by James O. Peck Co. of assembly savings made with Phillips Screws in leading plants.

"In show case assembly," explained the plant manager, "you're dealing with expensive, highly finished materials. That's one big reason we've been using Phillips Recessed Head Screws for over ten years.

"DRIVER SLIPPAGE ELIMINATED 100%. We went to Phillips Screws because we'd had so much driver slippage with slotted screws. A driver jumping out of the slot would often gouge finished wood, so that expensive repairs or an entirely new piece were necessary. Often costly plate glass would be broken. Phillips Recessed Head Screws put a stop to such spoilage completely.

"NO BURRED HEADS HAZARD. Phillips Screws don't burr, so polishing cloths are not snagged, or merchandise such as stockings and underwear damaged. In show cases for food, where moisture is present, this freedom from burring leaves the plating on screw heads intact so that there is no unsightly rusting.

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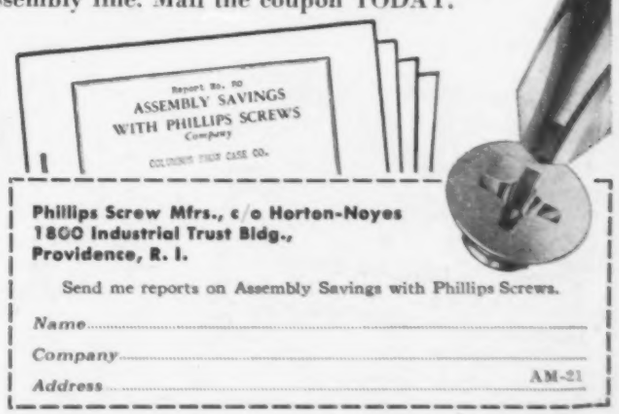

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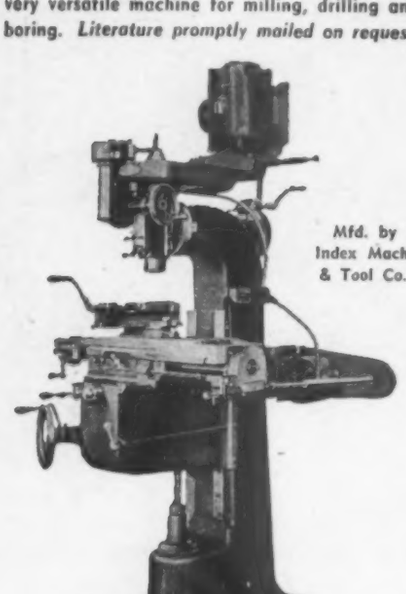

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on the part of the president of the Watch Worker's Union to make such a statement as was shown at the conclusion of your article. I would enlarge upon his admonition with the following: The basic foundation of our system of free enterprise is not just to help the employer to make a good profit; it is to do all we possibly can to produce to the maximum, with the highest pay for the workers, of a product having exceptional quality at the lowest possible selling price—taking into consideration the physical and mental welfare of the worker and a profit to satisfy the investors whose money has been put into the management's trust.

John Homewood
Ontario, Calif.

NEW BOOKS

PROBLEMS IN BASIC ENGINEERING DRAWING—*By Prof. H. D. Orth, Asst. Prof. R. R. Worsencroft and Asst. Prof. H. B. Doke, Department of Drawing and Descriptive Geometry, University of Wisconsin. Published by Irwin-Farnham Publishing Co., 332 S. Michigan Ave., Chicago 4, Ill. 9 x 11 in. Paper covered. Price $2.50.*

Planned to follow the sequence in *Basic Engineering Drawing*, but variable to suit any course and text, this set of problems covers a complete course in engineering drawing. Problems presented are of three classes: (1) completion problems, which emphasize particular points and which should be sufficient to enable student to master the theory; (2) practice problems, designed for further exercise on particular points; and (3) drafting problems, for which the student makes complete mechanical drawings.

About 150 problems are included. They not only vary in type but also in difficulty, so a well-rounded, balanced course is provided that should hold the student's interest and develop his drafting ability.

•

MEASURING AND RATING EMPLOYEE VALUE.—*By John B. Probst, consultant in personnel administration. Published by The Ronald Press Co., New York, N. Y. 166 pages. Price $5.00.*

The check-list method of evaluating employee worth is only one of several now in use and by no means as popular as the so-called scale methods. While check lists admittedly minimize halo effect, are easy to use and provide ready comparisons between employees on different work, their construction is so difficult and requires so much research and statistical analysis that most companies shy away from them.

Presented in this book is a ready-made check list, the Probst Rating System, that consists basically of several service report forms and a special scoring-rating process for evaluating checked reports to produce employee ratings, separated into ten groups designated as A to E. Details and operation of the plan are fully discussed, together with its validity and reliability. Included are results of experimental tests of rating methods and of other identical tests, such as effect of age on job performance, success prediction and employee changes.

Mr. Probst's influence on the creative thinking that has been done, and is being done, in the field of employee rating would alone make this book worth-while reading for those in personnel administration.

•

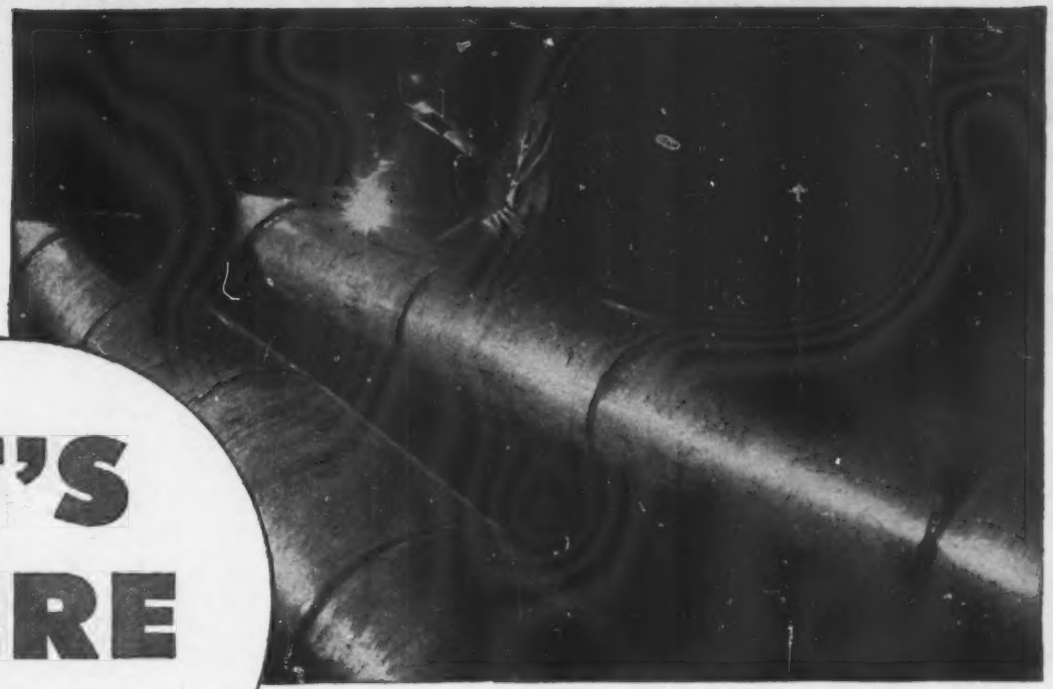
PLASTICS MOLDS—*by Gordon B. Thayer, Plastics Research Engineer, The Dow Chemical Company. Published by Huebner Publications, 2460 Fairmount Blvd., Cleveland 6, O. 272 pages. Price $5.*

In this third enlarged and revised edition, the author deals with the design, manufacture and use of molds. Compression mold types are classified for study; transfer and jet molding described and injection molds are presented both as units and broken down into their elements of design and construction. Mold sinking, applications of mold-base standards and molding of screw threads are described in detail.

Ejector systems for injection molds are covered thoroughly and suggestions are made for trouble-shooting ejection difficulties. Mold plating with hard chromium and the electroplating process are described in detail.

A chapter is given to finishing methods and equipment, including tools, machines and accessories. Plastic tooling from liquid resins is covered and brought up to date. Nomenclature of plastics molding has been enlarged over previous editions.

Semi-standard methods for estimating plastics mold costs is described and time values for operations established. One chapter gives 149 practical painters in mold design and construction.



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18-8Mo	316	1/16 to 1/4"	"	"
25-12	309	1/16 to 3/16"	"	"
25-12Cb	309Cb	1/16 to 1/4"	"	"
25-20	310	1/16 to 3/16"	"	"
25-20Cb	310Cb	3/32 to 3/16"	"	"
25-20Mo	310Mo	3/32 to 3/16"	"	"
18-8Mo-Cb	316Cb	3/32 to 3/16"	"	"
18-83.5Mo	317	1/16 to 1/4"	"	"
35Ni-15Cr	330	3/32 to 3/16"	"	"
4-6Cr .5Mo	502	3/32 to 3/16"	"	No
9Cr .50Mo	....	3/32 to 3/16"	"	"
12Cr	410	3/32 to 3/16"	"	"
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BASIC ENGINEERING DRAWING — *By Prof. H. D. Orth, Asst. Prof. R. R. Worsencroft and Asst. Prof. H. B. Doke, Dept. of Drawing and Descriptive Geometry, University of Wisconsin. Published by Irwin-Farnham Publishing Co., 332 S. Michigan Ave., Chicago 4, Ill. 345 pages. Price $3.50.*

Based on material used for many years in the authors' classes, this textbook covers in detail the fundamentals of drawing which every engineering student must know and be able to apply. It does not pretend to cover specialized phases.

In addition to usual theory on orthographic representation, sectioning, lettering, sketching, drawing practice and geometrical constructions, it includes basic information on shop processing, dimensioning, threads, fasteners and machine elements. The chapter on pictorial representation, although well presented, could have introduced to the student the theory and use of exploded diagrams.

The examples shown throughout the book have been well selected to furnish adequate instruction, both as to the theory and practice of engineering drawing.

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BIBLIOGRAPHY OF INDUSTRIAL ENGINEERING AND MANAGEMENT LITERATURE—*By Ralph M. Barnes, professor of industrial engineering and director of personnel, College of Engineering, and Norma A. Englert, librarian, Engineering Library, University of Iowa. Published by Wm. C. Brown Co., Dubuque, Iowa. Fifth edition. 136 pages—8½x11 in. Price $3.00.*

This fifth edition revises the bibliography up to Jan. 1, 1946. Originally prepared for arranging study courses, it was later expanded to include most of the important books and many magazine articles on the subject to adapt it for industrial reference use.

More than 1,200 books and bulletins and over 3,000 articles from 145 magazines are now listed. The bibliography is not annotated. It contains author's name, title, publisher, volume number, page number and date. The classified index of magazine articles is broken down into 47 main heads and 79 subheads. Covering all phases of industrial engineering and management—time and motion study, job evaluation, production planning and control, quality control and many others, it is a most comprehensive guide.

MANUAL OF FOUNDRY AND PATTERN-SHOP PRACTICE—*By Otis J. Benedict, Jr. Published by McGraw-Hill Book Company, Inc., 330 W. 42nd St., New York 19, N. Y. 361 pages. Price $3.25.*

Starting with the basic equipment used in sand molding, and carrying through cast-iron and non-ferrous alloy-melting techniques, this handbook covers thoroughly every phase of foundry work, including complete treatment of the properties of sand and the various metals commonly cast, and a section on technological control, testing and inspection procedure. The second half of the book is devoted to patternmaking, from basic principles and theory to patternmaking tools and materials. Of particular interest are the chapters on construction methods, use and care of tools, and the characteristics of woods, and glues. The appendix, among other tables, carries a list of correlated film strips and movies which are available from many sources and can be used as a valuable adjunct to a training program.

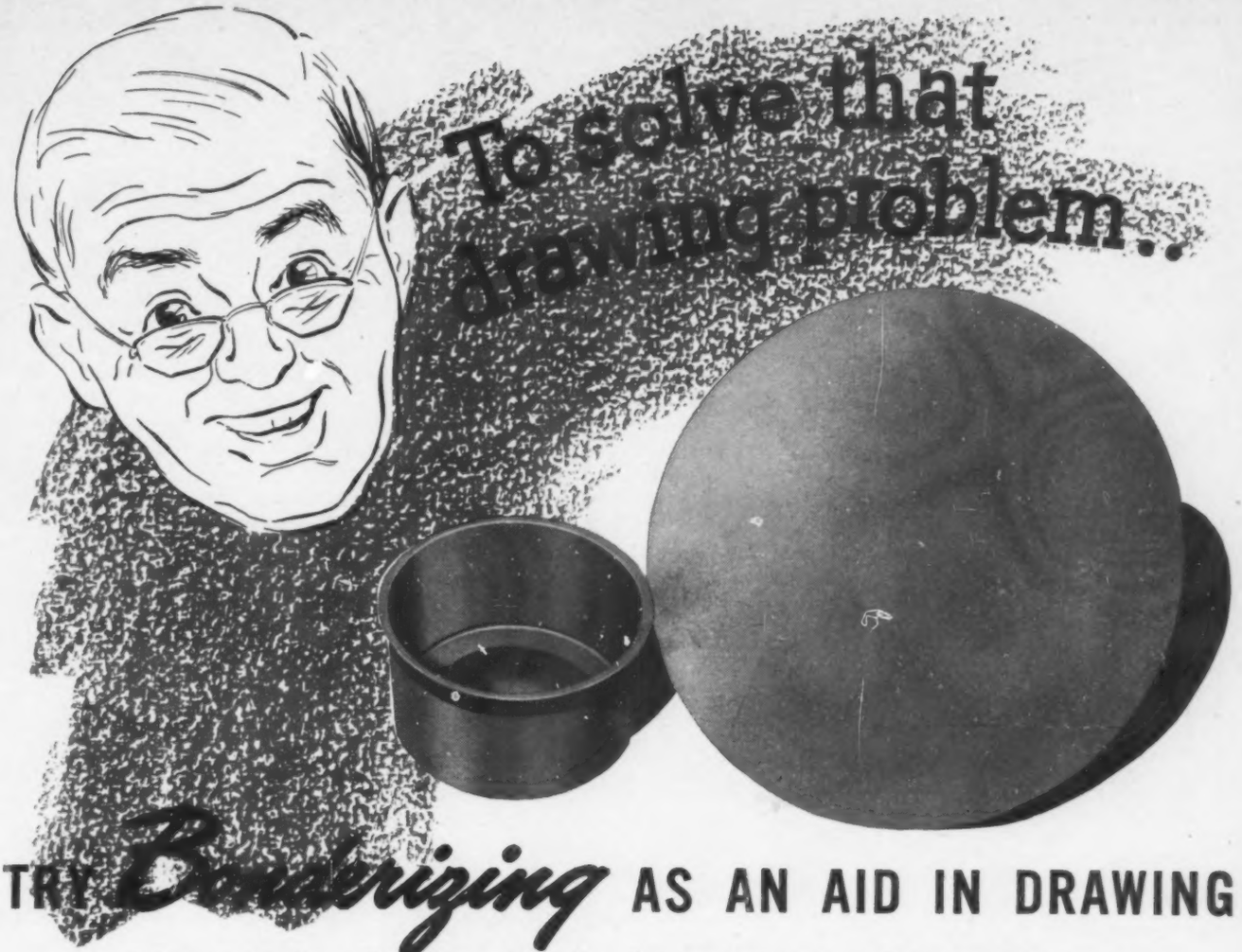
•

CONTRACTS IN ENGINEERING — *By James Irwin Tucker, B.S., LL.B. Published by McGraw-Hill Book Company, Inc., 330 West 42nd St., New York 18, N. Y. Fourth edition. 341 pages. Price $5.00.*

Primary objective of this textbook is to enable the engineer to examine critically, to understand better and, if necessary, to prepare fair and effective contracts for engineering construction and for ordinary purposes. The author appreciates the engineer's responsibility in business fields and here offers, in the revised edition, a text by which that responsibility can be based on a substantial knowledge of contract theories.

The text is developed logically through contract essentials and principles, agency, tort, real property, association, sale and transportation contracts and negotiable paper up to a valuable chapter on preparing and writing engineering contracts. Discussed from an engineering viewpoint, this latter material should be of great use to any engineer who may be called on to furnish either specifications or specifications and contract.

For teaching purposes, each chapter is followed by an extensive list of review questions and problems and a topic diagram that shows the correlation of subjects treated. The review questions should save much time in preparing lessons and insure comprehensive coverage.



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CONCISE CHEMICAL AND TECHNICAL DICTIONARY—*Edited by H. Bennett, technical director, Glyco Product Co., Inc. Published by Chemical Publishing Co., Inc., 26 Court St., Dept. FM, Brooklyn 2, N. Y. 1120 pages. Price $10.*

Containing approximately 50,000 definitions, this dictionary covers every field of scientific and technical development. Many internationally accepted terms are included as a means of fostering mutual understanding between the scientists and technical workers of many countries.

Definitions are concise, clear, and to the point. Thousands of abbreviations, contractions, and many useful tables are included. A special feature is an up-to-date compilation of thousands of trade-name or proprietary products. The specialist, who knows his own particular field but is only slightly acquainted with terms used in other phases of industry, should find this dictionary of assistance.

•

Surface Plates to Millionths

AMONG UNEXPECTED additions to metalworking equipment during World War II were granite surface plates produced to accuracies of 25 millionths of an inch. Assuming there must be an unusual story behind them, we investigated. There was.

One of the four present manufacturers is Seth M. Velsey, Dayton sculptor who won first prize for a carved wood figure at the Paris International Exposition before the war, and who applied his knowledge of stone to producing a new kind of surface plate.

Prime requisite was to obtain a hard stone which would finish to the proper surface and whose structure would remain unaffected by temperature, jarring or molecular strain. Olivine Diabase, called "black granite" commercially, weighing 190 lb. per cu. ft. as compared with the 165 lb. of granite, was selected. It was found to be almost non-absorbent, to have a coefficient of expansion about that of fused quartz, and with a hardness of Rockwell (30 T) 96, or 93 to 98 scleroscope.

Slabs of this material are roughed down to within a few thousandths of flatness with the rotary metal disk used in surfacing architectural granite. Smaller plates (up to 24x36x6 in., for example) weighing less than about 600 lb. are thereafter lapped similarly to optical flats, with five or six grades of abrasive ranging from coarse to very fine. Optical flatness can be obtained (1 to about 5 millionths for the entire surface), but such precision is not normally required commercially

In large plates (such as the five 4 x 8 ft. ones recently made for Buick), required entire-surface accuracy of 0.0001 in. was obtained entirely by spot lapping.

Plates are checked to accuracies of 50 millionths by two methods, one involving straightedges and light, and the other with a large standard indicator (1 rev. = 0.006 in.) on a steel arm mounted on a heavy triangular steel base, ground and lapped. For greater accuracies, special optical methods must be used.

Mr. Velsey made his own straightedges of bar steel, lapped by the optical method in series of three. For an 8-ft. straightedge, it was found more accurate to rivet two 4-ft. edges together, aligning them with a third. In spite of the fact that the steel was normalized, straightedges kept changing during the first two years of use. A change of 5F. in room temperature will make straightedges inaccurate, so they must be relapped for summer and for winter temperatures.

One practical pointer we picked up is that between straightedge and plate, an observer can actually distinguish objects through a slot of 0.001 in., and that light from an electric bulb viewed through such a slot changes from yellow to blue, then purple, as the slot narrows. When the light appears dark blue or purple, the slot is about 0.0001 in. wide.

Among the advantages claimed for granite plates are that they do not burr or bulge when objects are dropped on them, do not corrode or become magnetic, and do not absorb oil or particles which could act as abrasives. Although the surface is not polished, it is sufficiently smooth so that it is not abrasive.

Indications are that plates retain their accuracy indefinitely. Thus far, only three plates have been returned for resurfacing, two used as lap plates (not recommended) and one used for heavy castings, under which sand and scale ground the surface down.

A recent development is a straight plane with 8 x 36-in. face, 6 in. thick. This block weighs about 200 lb. and is used to give lateral as well as linear coverage for high-spotting surfaces to be ground or scraped. The bearing surface is brought to a flatness accuracy of 25 millionths inch, so can be used to check in scraping surfaces such as a machine bed to tolerances of 0.0001 in. or

The Victory of Standardization

Mass production during World War I brought into sharp focus the need for screw thread standards throughout industry. Interchangeable parts were the essence of America's assembly lines.

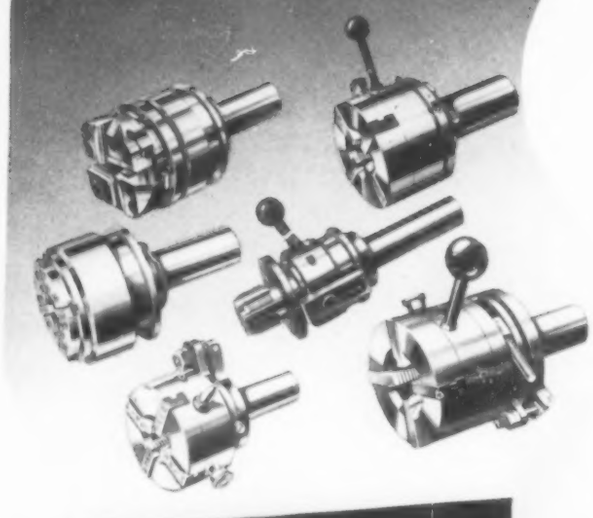
When the National Screw Thread Commission met in Washington during the early 20's, "Greenfield's" president, the late F. O. Wells, urged strongly the adoption of standards for threaded parts. The efforts of Mr. Wells and others produced results which have meant vast savings to users of precision tools and have been a key to the industrial growth of the country. GTD "Greenfield" continues today to work for screw thread standardization as it has during its entire 75 years of pioneering leadership in the threading tool field.

GTD Greenfield 75th YEAR

The years following World War I found "Greenfield" pioneering in the development of ground thread taps. Ground on centers which themselves are lapped for high precision, a ground thread tap has an outside diameter, pitch diameter, shank and chamfer that are highly precise. This method of manufacture revolutionized threading tool performance by making possible an accuracy previously impossible on a production basis.

GREENFIELD TAP and DIE CORPORATION
Greenfield · Massachusetts

The GEOMETRIC TOOL COMPANY
New Haven, Connecticut · In Its Fifty-Fourth Year
A STOCKER OF GREENFIELD TAPS and DIES



THE
GEOMETRIC
TOOL COMPANY · NEW HAVEN 15, CONN.

We'll be glad to see you at the Machine Tool Show, Chicago, September 17-26th, Booth 50, where you will see in one place the entire Geometric line of screw threading tools and chasers. Many of these tools, some of which are shown at the left, will be in actual operation. And you won't want to miss the *new* Geometric products which will be on display there, too. We'll be more than glad to show you how Geometric threading tools are helping different types of industries all over the world and how Geometric tools can help you solve your threading problems.

P.S. Make your plans NOW to attend the MACHINE TOOL SHOW at the DODGE CHICAGO PLANT, SEPTEMBER 17-26th, and call on THE GEOMETRIC TOOL COMPANY at BOOTH 50. This is one show you can't afford to miss.

FREE LITERATURE

New Catalogs, Booklets, Bulletins

(Not Good After October 1, 1947)

MACHINES AND ATTACHMENTS

1 TRACER MILLING—Pratt & Whitney, Div. Niles-Bement-Pond Co., West Hartford 1, Conn. 12-page bulletin 490 describes and illustrates Type BL Keller automatic tracer-controlled milling machine. Unit is operated by simple electric circuits, can use finished products as masters.

2 PIERCING — Mueller Engineering Co., Detroit 26, Mich. 32-page catalog presents line of hydraulic piercing units with automatic hydraulic stripping. Typical job performed: piercing automobile-frame side-member assemblies.

3 TOOL GRINDERS—Oliver Instrument Co., Adrian, Mich. 12-page bulletin on "Ace" tool and cutter grinder. Work is held stationary while grinding wheel traverses edge. Also describes "Ace" precision grinder for tungsten-carbide tipped tools.

4 LATHE TURRETS—Automatic Machine & Tool Co., Auburndale, Mass. 8-page bulletin covers five-station oscillating-toolblock lathe turrets. Made in four sizes for lathes from 9- to 30-in. swing.

5 TURRET LATHE—Warner & Swasey Co., Cleveland, Ohio. 12-page bulletin on 16-in. Electro-Cycle turret lathe. Any working sequence can be pre-selected and set by simple adjustment of automatic control mechanism mounted on ram.

6 BAR FEED—Hy-Level Screw Products Co., Cleveland 13, Ohio. 4-page bulletin describes liquid-pressure bar-feed attachment for automatic screw machines. Power is supplied by pump already on screw machine, liquid is coolant already employed.

7 MULTI DRILLER—National Automatic Tool Co., Inc., Richmond, Ind. 8-page bulletin 247 on A-33 light, sensitive, multi driller or tapper. Head is bored for 10 spindles. Three feed arrangements are available.

8 MILLING MACHINES—The Cincinnati Milling Machine Co., Cincinnati 9, Ohio. 24-page bulletin M-1555 covers Nos. 1-12 and 1-18 plain automatic milling machines. Units have automatic table-traverse cycles. Also available is 16-page bulletin M-1532 on No. 0-8 vertical milling machine.

9 INCLINABLE PRESS—The Hydraulic Press Mfg. Co., Mount Gilead, Ohio. 4-page bulletin 4703 describes high-speed inclinable hydraulic press. Unit provides up to 100 strokes per min. with pressures to 50 ton.

10 BELT SANDING—Clover Mfg. Co., Norwalk, Conn. 12-page booklet No. 2, "Belt Sanding of Metal," discusses principles underlying accuracy of vertical- and horizontal-platen sanders for dry and lubricated belts.

11 BROACHING—The Lapointe Machine Tool Co., Hudson, Mass. 8-page bulletin is first issue of "Broaching Briefs," published quarterly. Issue includes several broaching applications, describes new film.

12 PUNCH PRESSES—Sales Service Machine Tool Co., St. Paul 4, Minn. 4-page bulletin covers Press-Rite open-back inclinable punch presses built in four sizes from 5 to 30 ton. Units have single-stroke attachment.

13 BENDER-CUTTER — J. A. Richards Co., Kalamazoo, Mich. 4-page bulletin describes "Multiform" Bender-cutter which is hand operated with compound toggle power to movable ram. Comes complete with assortment of dies and mandrels.

14 GEAR SHAVING—National Broach & Machine Co., Detroit 13, Mich. 4-page bulletin S47-3 covers Red Rinn diagonal gear-shaving machine. Line of feed is at adjustable angle with work-gear axis, extending cutting zone across full face width of cutter.

15 TUBE BENDERS—The Parker Appliance Co., Cleveland, Ohio. 14-page catalog 401 covers tube-fabricating equipment such as production benders, hand benders, flaring tools and bender kits. Also describes Parker tube-fabricating service.

16 GRINDING SAFETY — Grinding Wheel Manufacturers Association, Worcester 8, Mass. 20-page booklet, "Portable Grinding Machines—Safe and Efficient Operation," shows correct and incorrect methods of mounting wheels; includes protective devices and methods.

17 PNEUMATIC TOOLS—Keller Tool Co., Grand Haven, Mich. 60-page catalog describes line of pneumatic tools including drills, nut setters, screwdrivers, grinders, hammers and compression riveters. Also covers air hoists with capacities from 300 to 1000-lb.

TOOLS AND ACCESSORIES

18 EXPORT CATALOG—The Gauge & Tool Makers' Association of Great Britain, London, W.1, England. 140-page export catalog describes and illustrates tools made by members of association. Includes gages, jigs, fixtures, press tools, molds, dies, diamond tools, measuring tools.

19 BROACHES — The Connecticut Broach & Machine Co., New London, Conn. 56-page brochure, "Better Broach It," includes ten 4-page case studies to illustrate applications of broaches. Also available is 8-page booklet of broaching-data tables.

20 GRINDING WHEELS—The Sterling Grinding Wheel Div., Tiffin, Ohio. 44-page bulletin describes facilities of company, devotes 21 pages to descriptions of various grinding wheels and color prints of wheels in use.

21 TRIMMING DIES — The Steel Products Engineering Co., Springfield, Ohio. 16-page catalog covers Bream trimming dies for flat-edge trimming and notching of drawn shells. Parts can be trimmed in one press stroke.

22 LIVE CENTERS — Nielsen, Inc., Lawton, Mich. 8-page catalog NL-1 on improved live centers which have adjustment to take up wear or apply preload to bearings. Also describes live tailstock spindles.

23 CUTTING TOOLS—Illinois Tool Works, Chicago, Ill. 8-page bulletin: "Involute Spline Cutting Tools" covers hobs, shaper cutters and broaches. Discusses factors to consider when specifying cutters.

24 X-RAY — General Electric X-Ray Corp., Chicago 12, Ill. 36-page brochure on industrial applications of the X-ray. Also available is 36-page booklet, "The Story of X-Ray," which covers history and modern uses.

Example

Name John Roderick
Title Supt.
Company W. C. Dow Mfg. Co.
Co. Address 601 North St.
Brooklyn, 7, N.Y.
AMERICAN MACHINIST, New York

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1. If you are requesting four pieces or less, please use only the bottom card
2. Be sure to fill one space for each booklet
3. When you have filled out one card, detach, stamp and mail.

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25 CLAMPED-ON TOOLS — Carey-McFall Co., Philadelphia 25, Pa. 4-page bulletin describes and illustrates Car-Mac clamped-on tools which use carboloy standard tips of any grade. Also available is price list.

26 DIE HOLDERS — Beverly Blacksmith, Chicago, Ill. Two bulletins describe floating die holder and combination tap and die holder. The floating die holder can be operated through ½-in. capacity chuck in any drillpress or lathe.

27 GRINDING CARBIDE TOOLS—Norton Co., Worcester 6, Mass. 138-page handbook on methods of sharpening and reconditioning carbide cutting tools. Includes information on how to select proper grinding wheels. Book prepared in cooperation with various cemented-carbide manufacturers.

HEAT-TREATING AND WELDING

28 TUBE MILLS—American Electric Fusion Corp., Chicago 47, Ill. 12-page catalog describes three models of machine that converts strip steel into electrically welded tubing. Units automatically form, weld, straighten, size and cut tubing.

29 THERMOCOUPLES—Thermo Electric Co., Fairlawn, N. J. 32-page catalog includes industrial thermocouples, aircraft and engine thermocouples and lead wires for all pyrometers. Illustrates manufacturing facilities.

30 WELDING, CUTTING — Victor Equipment Co., San Francisco, Calif. 20-page four-color catalog describes and illustrates gas-welding and flame-cutting equipment. Prices are included. Parts are interchangeable to reduce obsolescence.

PLANT SERVICE EQUIPMENT

31 PRINTER-DEVELOPER — Ozalid, Div. General Aniline & Film Corp., Johnson City, N. Y. 22-page booklet describes Ozalid Streamliner which can reproduce anything typed, drawn, printed or photographed on translucent material. Makes positive copies in 25 sec.

32 BELT LACERS—Clipper Belt Lacer Co., Grand Rapids, Mich. Folder describes various machines for lacing spindle tapes, condenser tapes and belts from 1/16 to ⅛ in. thick.

33 BUILDING MAINTENANCE — Stonhard Co., Philadelphia 8, Pa. 48-page handbook covers more than 100 problems in maintenance and construction of floors, walls, foundations, roofs, etc. of industrial buildings.

34 BATTERIES—Gould Storage Battery Corp., Depew, N. Y. 40-page catalog 1000 describes sealed-in-glass batteries and racks for stationary applications. Describes construction in detail.

PARTS AND MATERIALS

35 VALVES—Alloy Steel Products Co., Inc., Linden, N. J. 56-page catalog 47 covers all Aloyco corrosion-resistant valves with photographs, cross sections, dimensional data and list of alloys in which each style is stocked.

36 OILS—Oakite Products, Inc., New York 6, N. Y. Two bulletins. One covers Oakite Soluble Oil, which is used to make up machining and wet-grinding coolants. The other covers Oakite Protective Oil to be used after or between operations to prevent rust.

37 FASTENERS—Penn Engineering & Mfg. Corp., Doylestown, Pa. 4-page bulletin on PEM self-clinching fasteners used on thin sheet metals. A clinching ring under the head squeezes the metal around the back-tapered portion of the shank, clinching the fastener into the sheet.

38 YOUR EYE-CUE — Parker-Kalon Corp., New York 14, N. Y. 16-page booklet tests the reader's Eye-Cue with some neat optical illusions. Infilters some technical data on size-marked Gear Grip socket-head capscrews.

39 GEARS—The Earle Gear & Machine Co., Philadelphia 44, Pa. 24-page catalog uses pictures, blueprints and text to describe various types and sizes of gears. One section is devoted to formulas. Also describes special machinery.

40 RUBBER BELTS—The B. F. Goodrich Co., Akron, Ohio. 12-page catalog section is guide to application and care of flat rubber belting. Also available is 4-page section on hard-rubber products.

41 COMPUTER—W. C. Dillon & Co., Inc., Chicago 44, Ill. Slide-rule type computer for calculating breaking strength of round or rectangular cross-section specimens. Computer is set at specimen size on upper scale, then breaking strength is read opposite tensile strength on lower scale.

42 COPPER—The American Brass Co., Waterbury 88, Conn. 28-page booklet, "Copper and Copper Alloy Specifications Index." In two sections: first part lists company's most generally used alloys; second part lists specifications in numerical order.

43 STEEL-PLATE SHAPES—By-Products Steel Corp., Div. Lukens Steel Co., Coatesville, Pa. 12-page bulletin describes steel-plate shapes available for industry. Shapes are made by flame-cutting, shearing, pressing, bending or blanking.

44 PUMPS—Worthington Pump & Machinery Corp., Harrison, N. J. Two 6-page bulletins describe horizontal duplex-plunger power pumps (Types KLF-KMF) and Type GR heavy-duty rotary pumps. Rotary units can handle viscous liquids such as tar.

45 LAMINATED PLASTICS—Plastics Div., General Electric Co., Pittsfield, Mass. 64-page booklet describes manufacture, applications and properties of all types of Textolite laminated plastics. Covers tubes, rods, sheets, silent gears, bearing materials and other products.

46 SPECIAL FASTENERS—The Lamson & Sessions Co., Cleveland 2, Ohio. 26-page bulletin describes "special-purpose" fasteners including locknuts, pipe plugs, aircraft fasteners, cotter pins, wire-rope clips, Lok-Thread studs and sheet-metal screws.

47 REFERENCE TABLES—Leslie Co., Lyndhurst, N. J. 12-page bulletin 467 contains data and tables to aid the engineer in laying out piping and related equipment. Contains material-selection chart, hardness-conversion tables and other data.

48 VARIABLE SPEED—The Oilgear Co., Milwaukee 4, Wis. 8-page bulletin 67110 describes line of small fluid-power variable-speed transmissions up to 3 hp. There are four styles of manual, hydraulic and hydro-electric control devices.

49 HYDRAULIC EQUIPMENT — Shell Oil Co., Inc., New York 20, N. Y. 44-page booklet devotes chapter to review of hydraulic principles. Also covers systems and equipment, hydraulic oil requirements and characteristics, and maintenance and cleaning of hydraulic systems.

50 CORROSION RESISTANCE — U. S. Stoneware, Akron 9, Ohio. 16-page bulletin, "Corrosion Resistant Materials and Equipment," describes materials used to prevent failure of equipment and products from corrosion. Also describes corrosion-resistant equipment such as pipes, filters, valves, mixers.

51 CENTRIFUGAL PUMPS — Allis-Chalmers Mfg. Co., Milwaukee, Wis. 4-page bulletin 52B6691 covers operating and construction features of line of Pedrifugal pedestal-type centrifugal pumps. Five sizes handle up to 500 gpm. at 100-ft. head.

52 ASTM STANDARDS — American Society for Testing Materials, Philadelphia 3, Pa. 242-page "Index to ASTM Standards." Book is adjunct to 1946 book of standards and makes easy the location of some 1400 standard specifications. Items are listed under appropriate key words. Also included is list of specifications and tests in numerical sequence of their serial designations.

MISCELLANEOUS

53 WESTERN MARKETS—Metropolitan Oakland Area, Oakland 12, Calif. 54-page brochure, "How to Win the Markets of the New West," contains latest information on Pacific Coast markets and manufacturing. Covers 11 western states.

54 DEPRECIATION — Kearney & Trecker Corp., Milwaukee 14, Wis. 20-page bulletin, "New Profits through Sensible Depreciation," explains how obsolescence is a vital factor in machine-tool depreciation. Includes statistics on age of machine tools in America.

55 THE HUMAN FACTOR — The Bunell Machine & Tool Co., Cleveland, Ohio. 8-page booklet, "Gearing Special Purpose Machinery to the Human Factor," tells how industrial psychology views man and machine as a team.

Real SkilTool Compactness and Handling Ease in

2 NEW SkilDrivers

for Driving Screws or Running Nuts

Model "304"
POSITIVE
CLUTCH

Model "303"
ADJUSTABLE
CLUTCH

● You just can't beat these new Electric SkilDrivers for fast driving of wood or self-tapping screws up to No. 12 : : : or machine screws and nuts up to ¼ in. diameter. And like all SkilTools, you can't beat SkilDrivers for light weight, compactness, easy handling and economical long life. See your SkilTool Distributor about a demonstration, or write for descriptive literature.

ELECTRIC PNEUMATIC

SkilTools

SKILSAW, INC., 5033 Elston Ave., Chicago 30, Ill.
Factory Branches in Principal Cities
In Canada: SKILTOOLS, LTD., 64 Portland St., Toronto, Ontario

on exhibit for the first time

2 GREAT

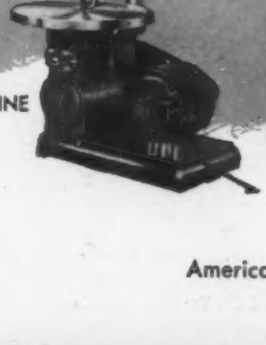
the Illinois Fine Pitch GEAR GENERATOR

Never before has there been a machine like the new Illinois Fine Pitch Gear Generator. It's new. All new . . . employing a unique full generating process that combines the outstanding advantages of both shaping and hobbing, and provides greater work accuracy through tool simplification. Designed primarily for fine pitch involute gears, both helical and spur, this machine generates any form produced by conventional methods. Capacity ranges from 30 pitch to 200 pitch; from almost no limit on the small side up to 3" in diameter; and will handle single blanks or stacks of blanks up to ¼" thickness. It can be magazine fed, either semi or full automatically. You won't want to miss this startling, new Illinois Gear Generator.

SEE IT AT BOOTH 302,
National Machine Tool Show,
Dodge-Chicago Plant,
Chicago, September 17-26.

MORE GOODS FOR MORE PEOPLE AT LOWER COST

BOOTH 302 **MACHINE TOOL SHOW**
DODGE CHICAGO PLANT



ILLINOIS DIE FILING MACHINE

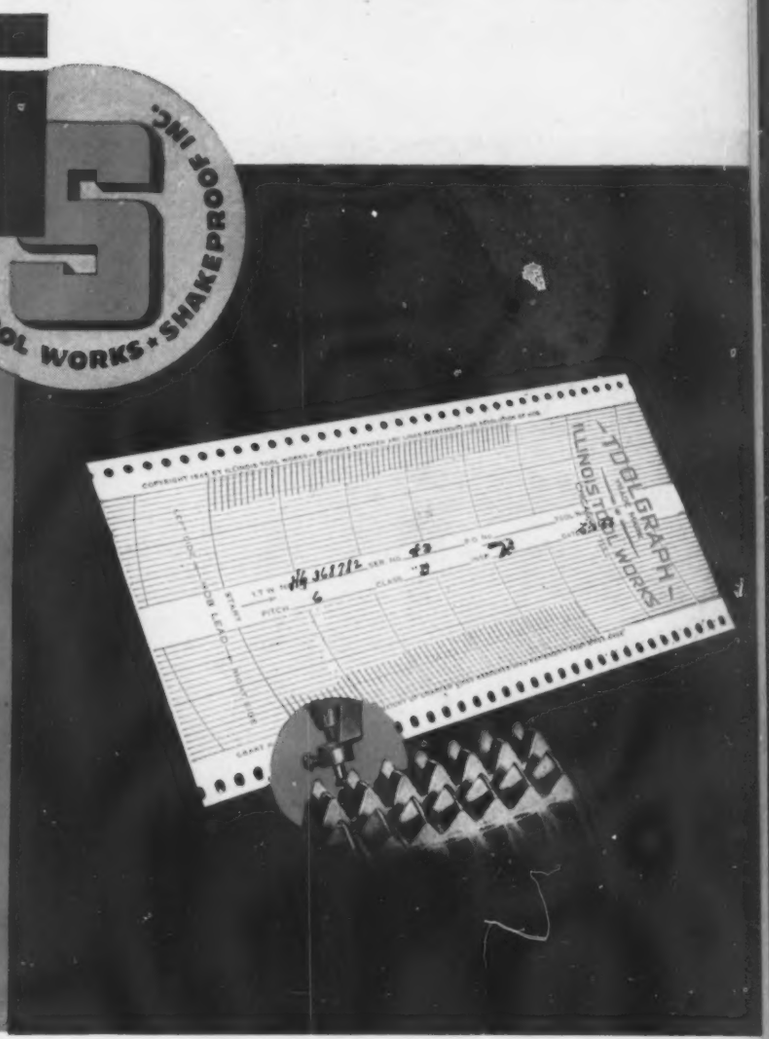
OTHER SHOW FEATURES

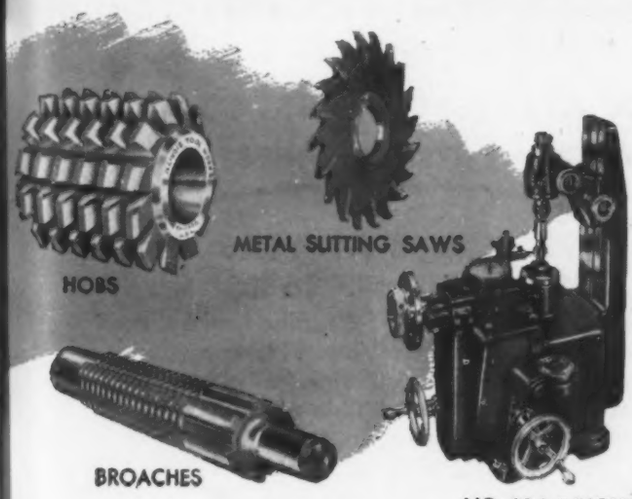
The Illinois Die Filing Machine for sawing, filing and stoning; the No. 124 Illinois Involute Checker for involute gears from the smallest up to 2" diameter base circle; and a complete display of Illinite High-Speed Metal Cutting Tools.

Illinois Tool Advancements

the TOOLGRAPH CHART *electrically recorded hob analysis*

Once again Illinois Tool demonstrates the kind of leadership that has earned for it a 35-year reputation as an outstanding producer of metal cutting tools . . . for now, packed with each Illinite Hob, goes an electrically recorded chart of the hob lead which reveals the pattern, as well as the magnitude, of any deviation within the tolerance more clearly than the tables of indicator readings commonly furnished. This is called the TOOLGRAPH chart, and it shows the exact location of each tooth on a hob in relation to all other teeth and in relation to the desired theoretical lead helix. The TOOLGRAPH chart gives absolute assurance that the helix of every hob is within the guaranteed tolerances. The Illinois Tool electrical recording system that produces the TOOLGRAPH chart will be shown at the Machine Tool Show. Be sure to see it! Illinois Tool Works, 2501 N. Keeler Ave., Chicago 39, Ill.





NO. 124 INVOLUTE CHECKER

ILLINOIS TOOL WORKS CHICAGO, ILL.

Copyright 1947 by Illinois Tool Works

TRADE **Verson** MARK

...from 60 TONS UP!

- BLANKING
- DRAWING
- FORGING
- COINING
- IRONING
- BENDING

One of the "babies" of the Verson line is this No. 7½ Open Back Inclinable. Rated at 105 tons capacity it weighs 24,000 pounds and has an overall height of 139 inches.

Whatever your requirements, if they call for 60 tons or more, you'll find there is a Verson Press suited to your needs . . . single, double and triple action straight side mechanicals and hydraulics, gap frame mechanicals and hydraulics, open back inclinables, post type hydraulics, press brakes and high production models including fully automatic transfer feed presses.

There are over 5000 Verson Presses in daily use all over the world taking part in the production of everything from ash trays to box cars. The allsteel welded frame, originated by Verson over 25 years ago, plus numerous other engineering advances makes it possible for these presses to do their job efficiently and dependably in the severest service.

VERSON ALLSTEEL PRESS COMPANY
9316 S. Kenwood Avenue, Chicago 19, Illinois

OPEN HOUSE AT VERSON
September 17 to 26

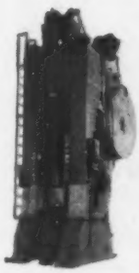
When you're in Chicago for the Machine Tool Builders' Show, be sure to include the Verson Plant in your itinerary. All press building facilities will be in operation and in addition, several Verson presses will be set up and operating for your inspection.

ORIGINATORS AND PIONEER BUILDERS OF ALL

press for every job!

Open Back Inclinable

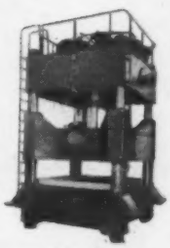
Straight Side Mechanical; Single, Double and Triple Action



Knuckle Joint

Straight Side Hydraulic; Single, Double and Triple Action

Gap Frame Mechanical and Hydraulic



Post Type Hydraulic

High Production Presses

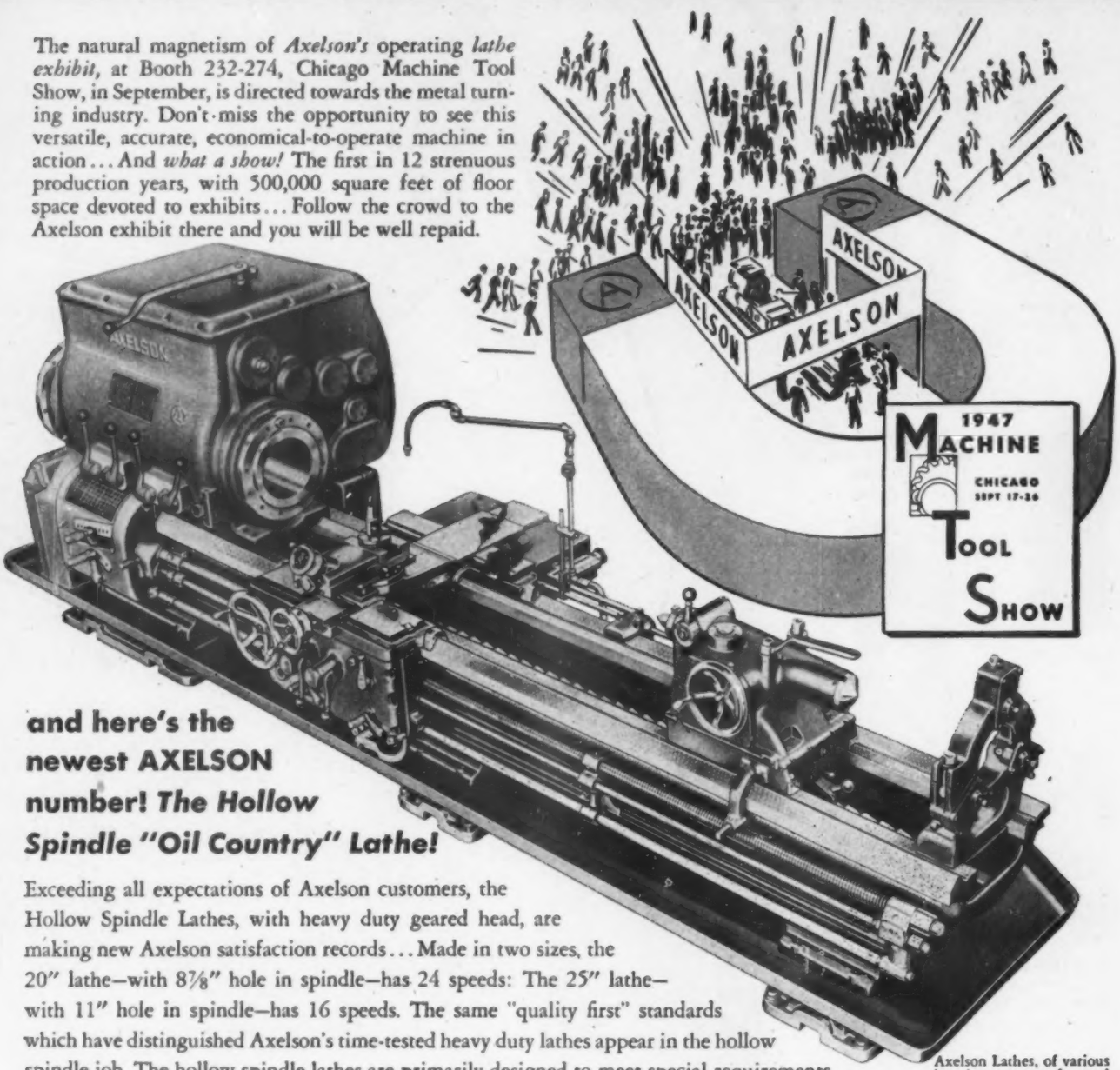
Press Brakes

A giant of the Verson line is this 3000 ton Verson Full Eccentric Press. It measures 154 inches between housings and stands three stories high. While rated at 3000 tons it has developed 4500 tons under test. Approximate weight is 600,000 pounds.

OF ALLSTEEL WELDED PRESS CONSTRUCTION

Powerful Attraction!

The natural magnetism of *Axelson's* operating *lathe exhibit,* at Booth 232-274, Chicago Machine Tool Show, in September, is directed towards the metal turning industry. Don't miss the opportunity to see this versatile, accurate, economical-to-operate machine in action... And *what a show!* The first in 12 strenuous production years, with 500,000 square feet of floor space devoted to exhibits... Follow the crowd to the Axelson exhibit there and you will be well repaid.



and here's the newest AXELSON number! *The Hollow Spindle "Oil Country" Lathe!*

Exceeding all expectations of Axelson customers, the Hollow Spindle Lathes, with heavy duty geared head, are making new Axelson satisfaction records... Made in two sizes, the 20" lathe—with 8⅞" hole in spindle—has 24 speeds: The 25" lathe—with 11" hole in spindle—has 16 speeds. The same "quality first" standards which have distinguished Axelson's time-tested heavy duty lathes appear in the hollow spindle job. The hollow spindle lathes are primarily designed to meet special requirements of the oil industry with its tool-joint jobs and other long members used in drilling and pumping.

Axelson Lathes, of various lengths, are manufactured in 14, 16, 18, 20, 25, and 32-inch sizes. Also 20 and 25-inch hollow spindle "Oil Country" Lathes.

AXELSON MANUFACTURING COMPANY

6160 S. Boyle Ave. (Box 98, Vernon Station), Los Angeles 11, Calif. • 50 Church St., New York City 7
3844 Walsh St., St. Louis, Mo.

AXELSON

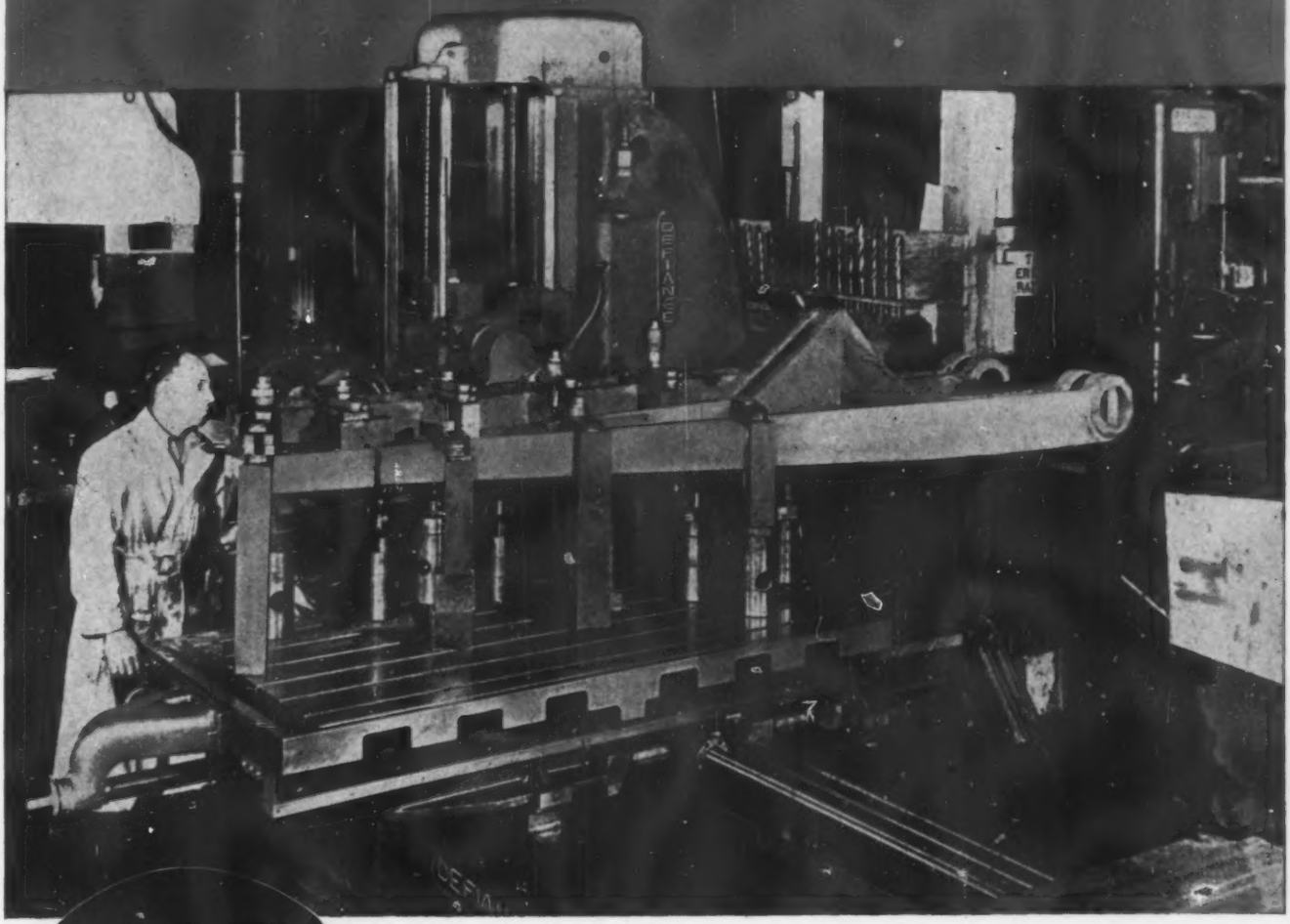
THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

Lathes

DEPENDABLE FOR OVER A QUARTER CENTURY

Boring with Accuracy

Where *Overhang* and *High Mounting* of work DEMAND EXTRA RIGIDITY!



THIS DEFIANCE BORING MILL *Operating 16 Hours a day* at HUFFORD MACHINE WORKS, INC.

Here's a job with unusual stresses—due to overhang of the extra long part being machined and high mounting of the work on the table. The part is one of the arms of stretch forming machines built by Hufford Machine Works, Inc., Redondo Beach, Calif.

Defiance Model 25-A Boring Mill used continuously by this plant since 1943 has the *right* features for difficult work like this! With extra strong saddle and table ways, well ribbed table, and base with outboard bearings—Defiance has the *rigidity* to maintain *accuracy*. Defiance Machines are extremely versatile—adaptable to a wide range of boring, milling, drilling and tapping operations . . . helping to increase production, save labor and cut costs! Write concerning your requirements. Defiance Machine Works, Inc., Defiance, Ohio.

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Looking at the installation illustrated on this page, it is easy to visualize the tremendous savings in payroll, maintenance and operational expense that result when one man and one truck handles 25 bodies, each having a capacity of 21 cubic yards.

At left, the four pictures, from top to bottom, show how the truck hoisting unit handles a body. First: Truck Hoisting Unit prepares to pick up body. Second: Operated from controls in the truck cab, the hydraulic hoisting unit lifts the load vertically. Note how the automatic hydraulic stabilizing jacks provide perfect balance for the load. Third: Load moves forward to carrying position on the truck for hauling. Fourth: At destination, body is dumped by tilting, or load can be lowered to the ground without being dumped.

Dempster-Dumpster bodies of capacities from 1½ to 21 cubic yards are made in the form of tanks, racks and open or closed for use with every type of material whether it be gas, liquid or solid. So regardless of the type or size of material you handle, it will pay you to investigate the Dempster-Dumpster System. A letter from you will bring illustrated literature and full information on this remarkable system of materials handling.

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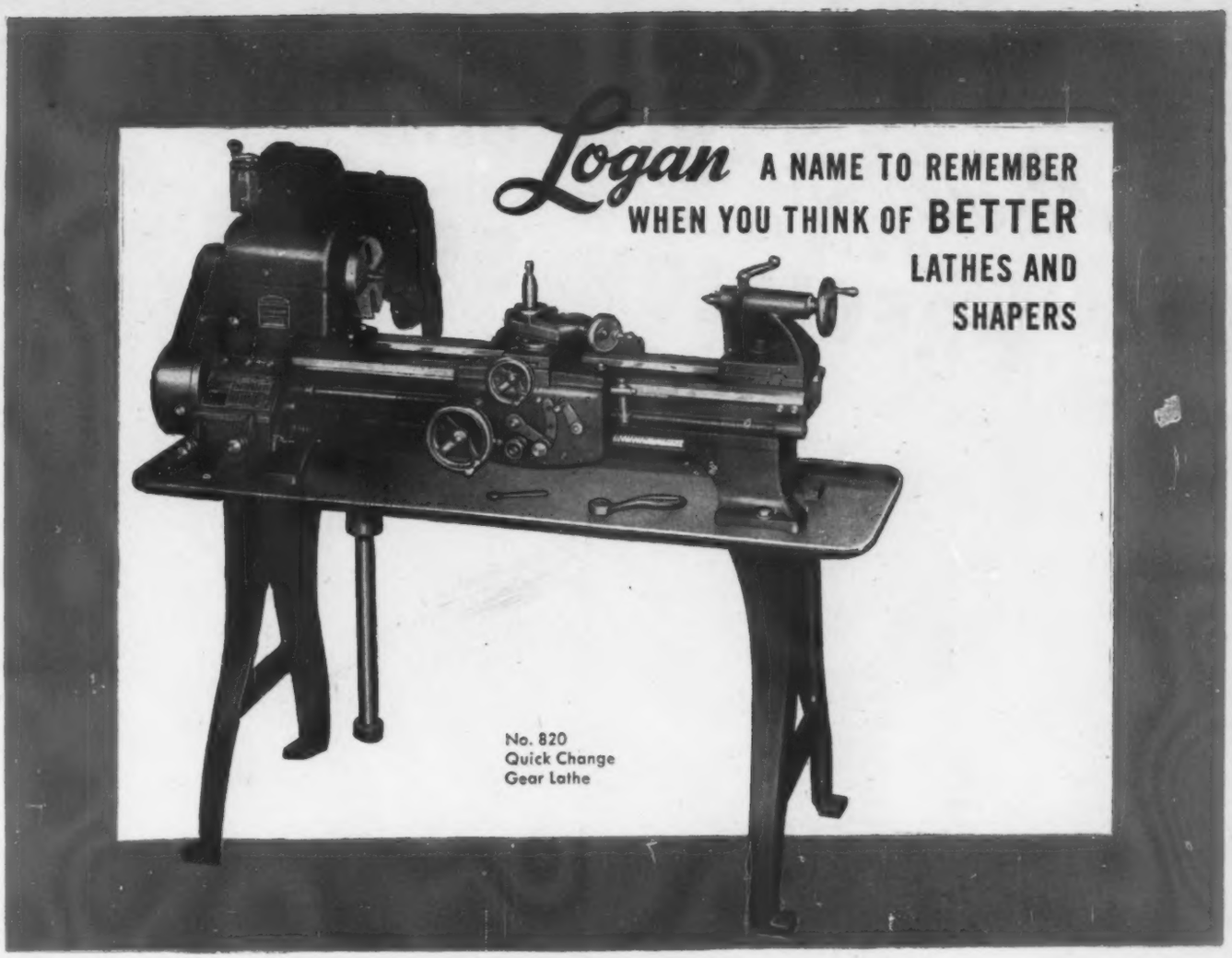

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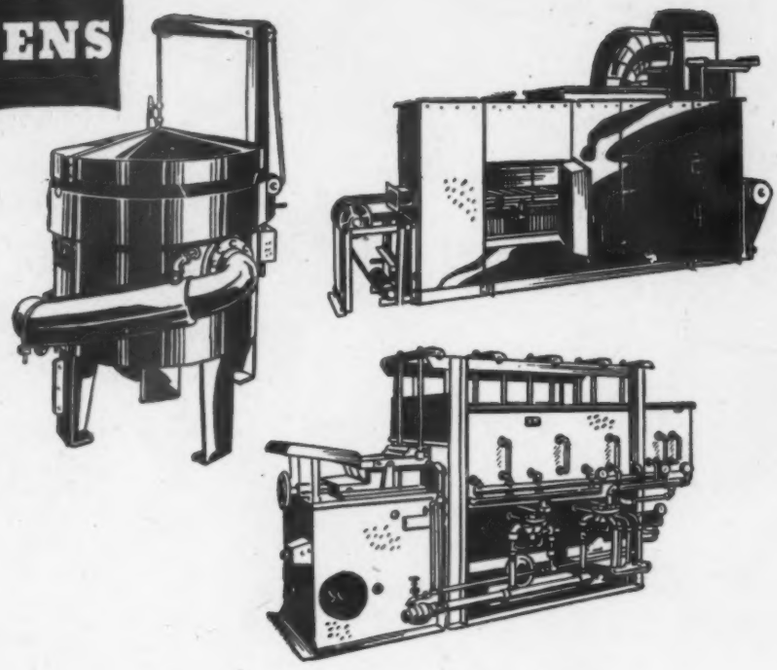

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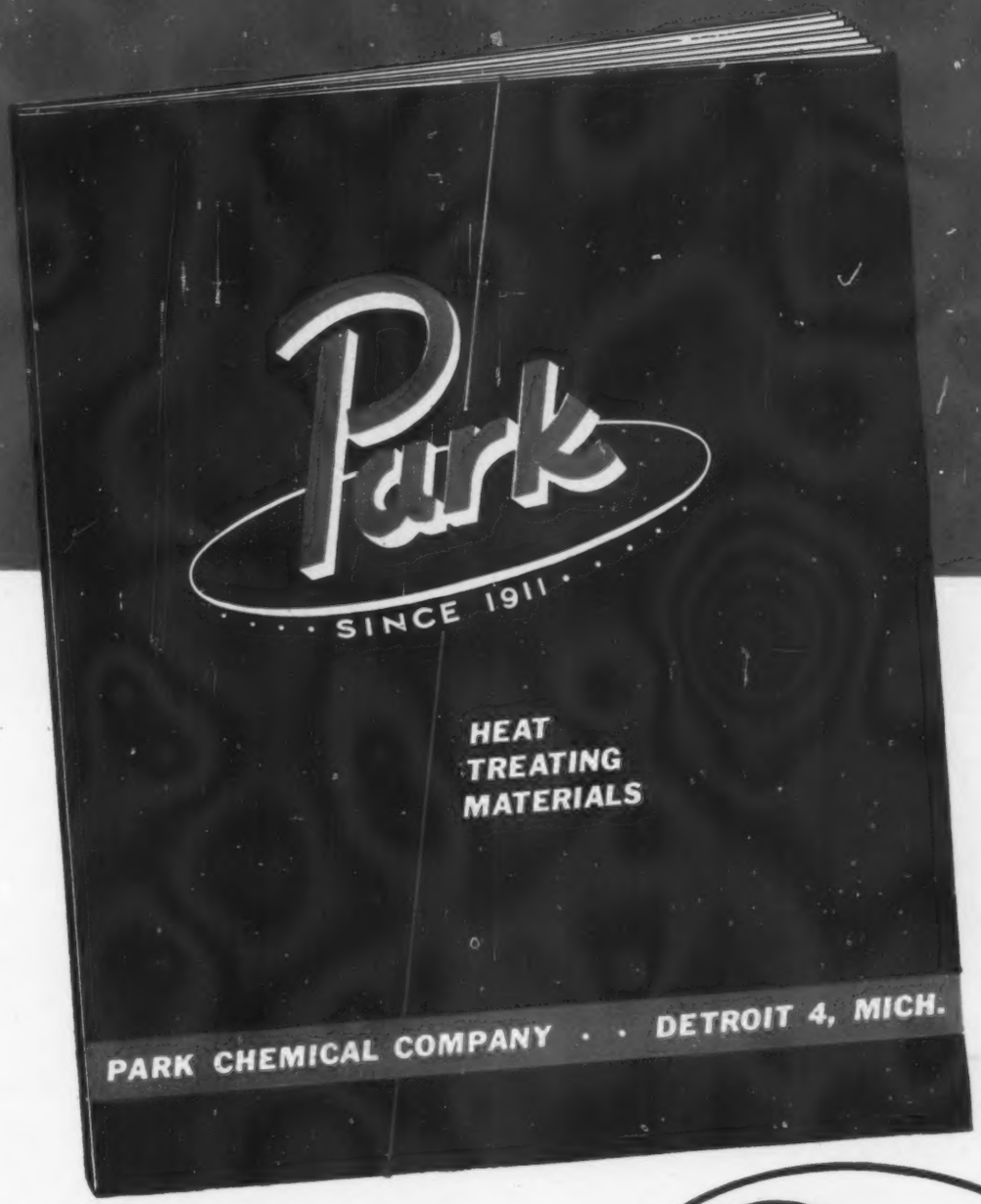

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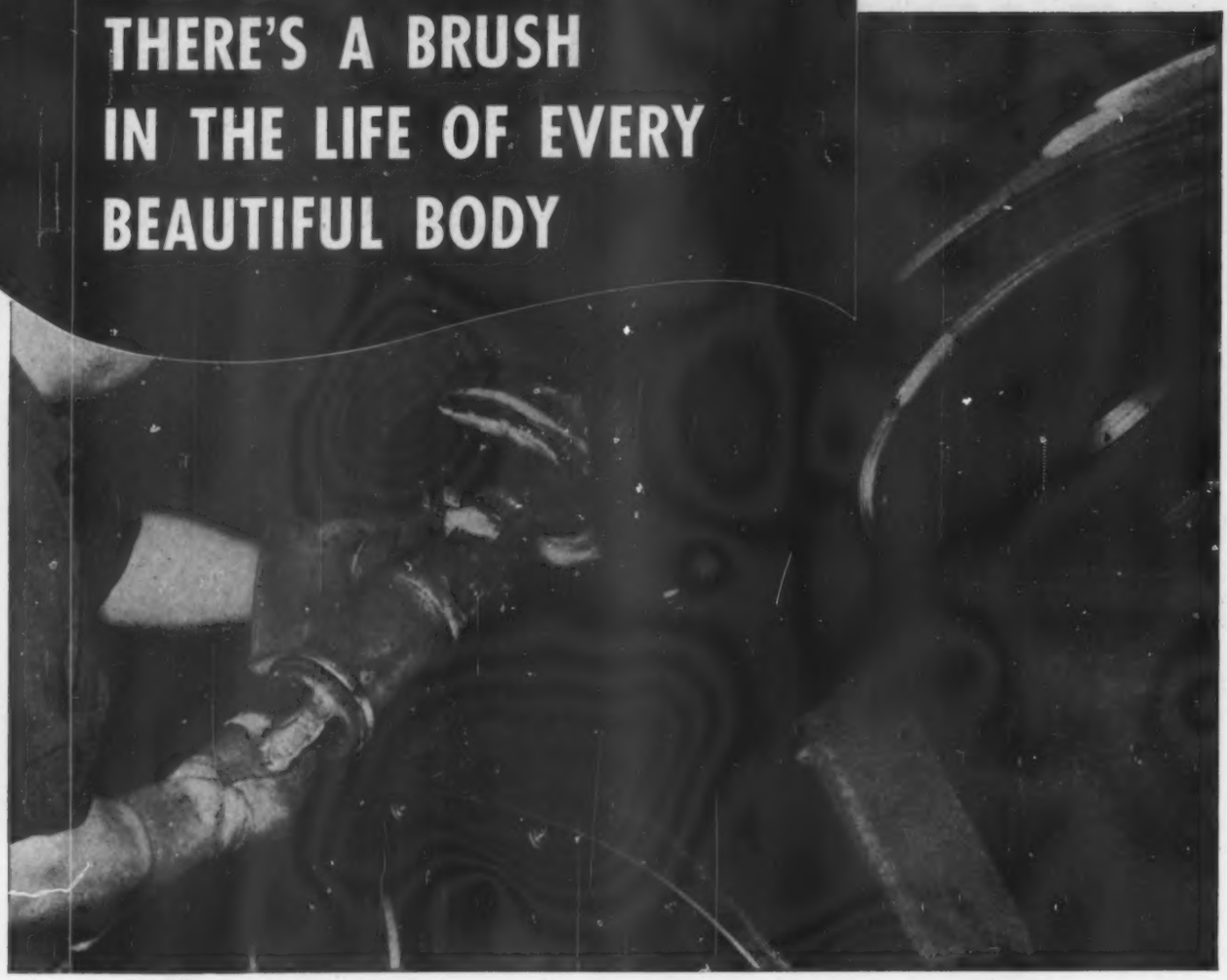

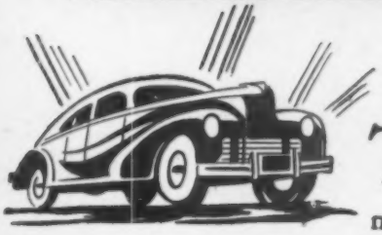

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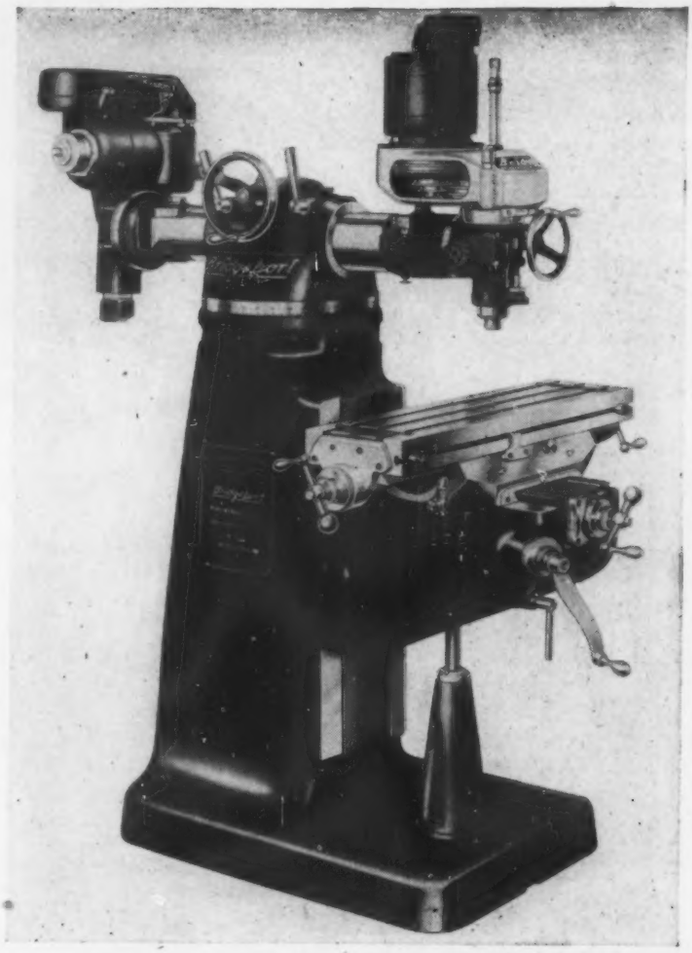

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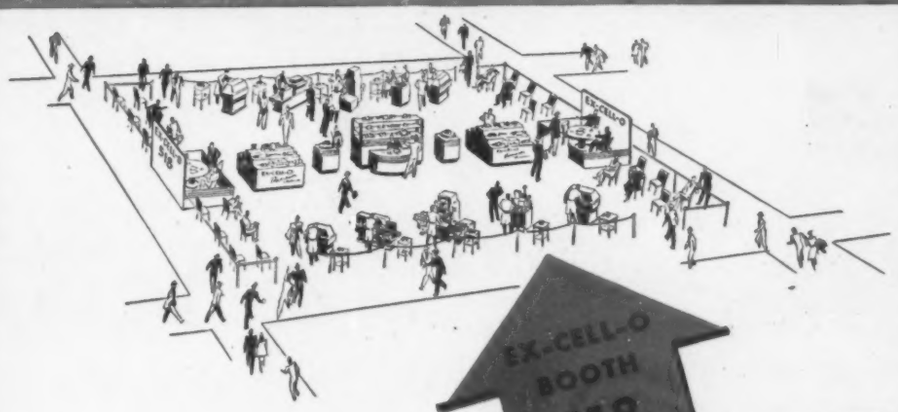

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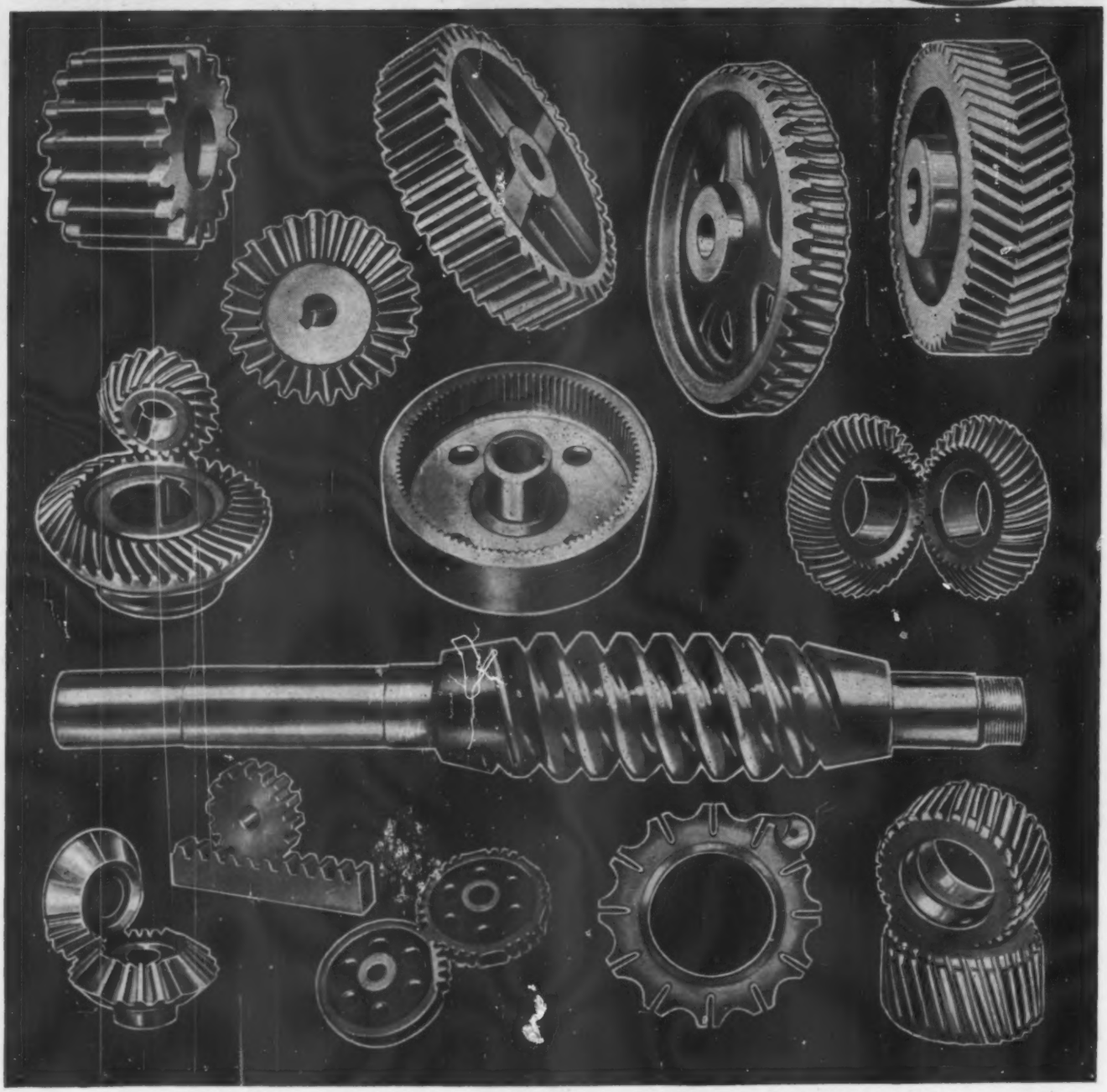

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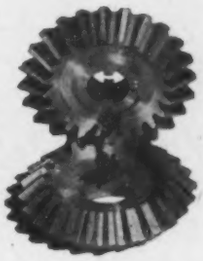

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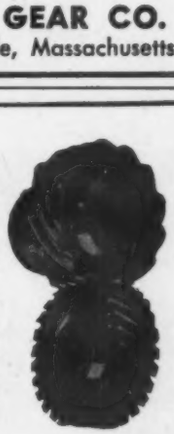

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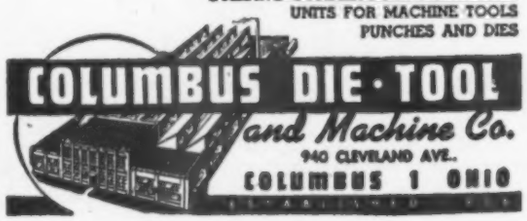

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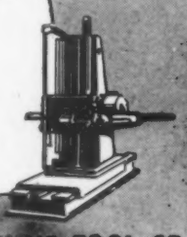

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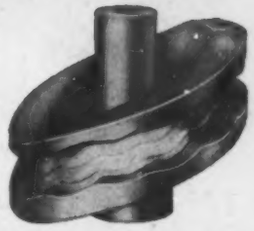

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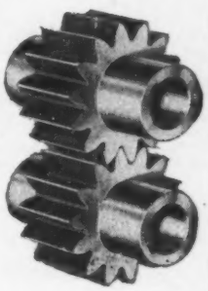

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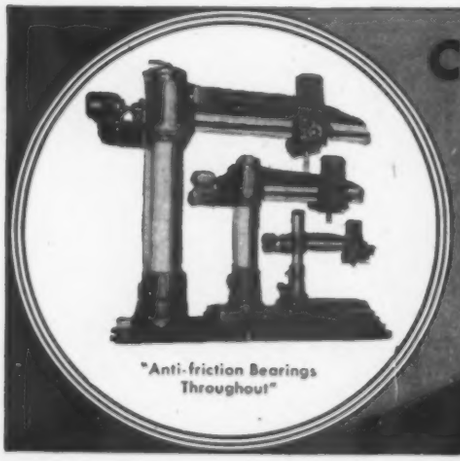

"Anti-friction Bearings Throughout"

CARLTON RADIAL DRILL

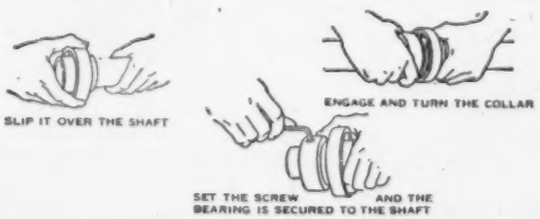
FEATURES: 1. Low Hung Drive to Spindle. 2. All Power Driven Parts Running in Oil. 3. Quiet Running at all Speeds. 4. Concentrated and Convenient Push-button Controls. 5. Constructed on Unit Principle.

THE CARLTON MACHINE TOOL COMPANY
CINCINNATI 25, OHIO, U. S. A.

DOUBLE RING *Wedding*

INSTEAD of orange blossoms, matching eccentric cams. That's how these two rings "wed" a Fafnir Ball Bearing to any standard size shaft... without shouldering, threading, lock nuts or adapter devices. It's the self-locking collar feature of the famous Fafnir Wide Inner Ring Ball Bearing... the Fafnir development that ended years of unnecessary bearing cost and complications.

Industries, hobbled with plain bearing equipped machinery, were able to change over to ball bearings... at a time cost of only a few minutes per bearing and no cost for machining or new shafting. And new machines featured these Fafnir Wide Inner Ring Bearings that can be removed as easily as they are installed.



Nothing could be simpler. The bearing slip-fits right onto the shaft. A quarter turn of the collar engages the eccentric cam with the matching cam of the extended inner ring, locks collar, bearing and shaft in a binding grip. As additional precaution, a set-screw in the collar is tightened to give a wedging action that is proof positive against shock or reversing loads. This Fafnir Wide Inner Ring Bearing is available in a full range of inch shaft dimensions for use in users' own housings and in a complete line of power transmission units... pillow blocks, hanger boxes, blower boxes and cartridges.

It's so simple, so sensible that you're sure to say the usual "Why didn't someone think of that before?" The answer, of course, is that thinking of simple, sensible ways to improve ball bearings is just the job Fafnir is set up to do. The Fafnir Bearing Company, New Britain, Connecticut.

FAFNIR BALL BEARINGS

MOST COMPLETE LINE IN AMERICA

★ 4 BIG REASONS WHY

the Standard COULTER "HT" Thread Milling Machine IS THE MACHINE FOR YOU!

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★ Can thread round, square and inserted chaser dies

★ The most economical of ALL threading machines

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The James COULTER Machine Co.

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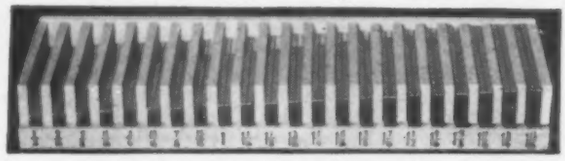
INCREASE PRODUCTION IMPROVE QUALITY USE ANTON PARALLELS ANTON PARALLELS FILL A LONG-FELT NEED—Permanently straight and accurate, yet priced for general machine shop use. All fully guaranteed to be within the limits specified. Maximum size tolerance .001 inch on ground sides. Maximum variation in parallelism and straightness within length, .0001. Rockwell "C" hardness 65 up.



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This low cost machine will handle internal keyseating jobs up to 1¼ in.

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BUZZER* INDUSTRIAL Gas EQUIPMENT

*Reg US Pat Off

NO BLOWER OR POWER NEEDED TO REACH HIGH TEMPERATURES WITH A "BUZZER" GAS FURNACE . . . JUST CONNECT TO YOUR GAS SUPPLY.

Rectangular Heat Baths

For liquid heat treating baths, soft metal melting, etc.

The High Speed Full Muffle Furnace quickly attains a temperature of 2400° F., and is designed for High Carbon and Alloy Steels.

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ATTAINS 2400° F. QUICKLY

Full Muffle Furnace (Bench Type)

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Where Cushman Power Chucks will be in actual operation as well as a complete showing of wrench operated chucks and a demonstration of the Power Wrench.

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ECONOMY
Grinding and Cutting Oils and Lubricants for Every Metal Working Purpose
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For cutting internal keyways, slots or splines 1/16" to 4" wide and up to 60" long. Fast—Accurate—Flexible. Write for particulars and catalog on machine for your work.
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ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY.
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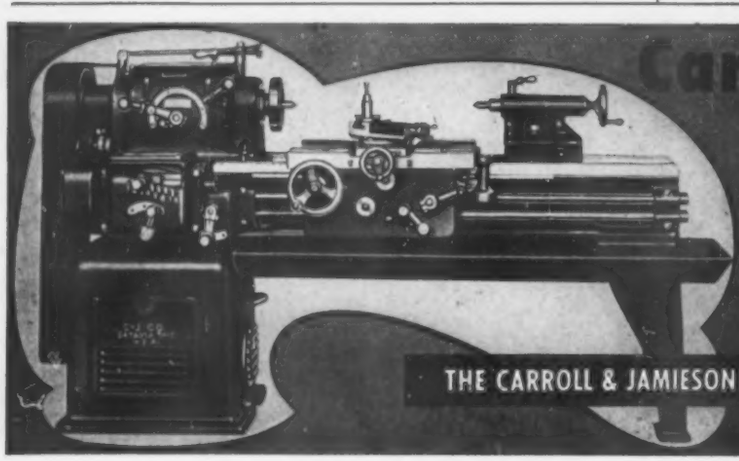
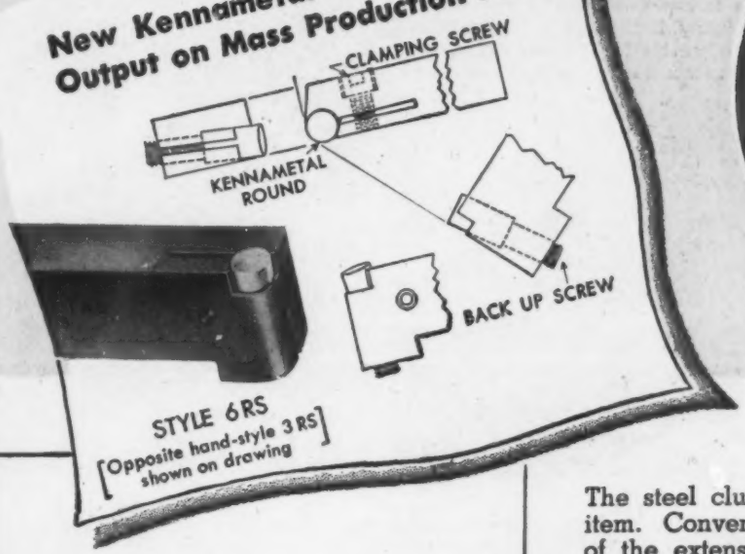


Carroll & Jamieson
16" LATHE
12 Speed Geared Head Motor Drive
Timken Mounted Spindle
Modern Design—
Liberal Dimensions
WRITE FOR BULLETIN
THE CARROLL & JAMIESON MACHINE TOOL CO., BATAVIA, OHIO, U. S. A.

ACTUAL SIZE OF THE KENNAMETAL ROUND INSERT
[Shown with chip breaker ground on both ends.]

KENNAMETAL ROUND MACHINES 89,600 GEARS!

New Kennametal Tool Sustains Output on Mass Production Jobs



Here is a new Kennametal tool that sustains output on mass production jobs, requiring complex tool set-ups.

It comprises a solid Kennametal round, clamped on end in a heat-treated steel holder, and supported by a back-up adjusting screw. Each end of the Kennametal round provides a circular cutting edge. A small section of this edge, depending upon depth of cut, bears against the work. When this section becomes dull, the clamping screw is loosened, and the Kennametal round is revolved around its axis to provide a new cutting edge. The clamping screw is then retightened.

After being thus indexed several times, until all of the cutting edge of one end of the round has become dull, the round is then turned end for end to provide another cycle of cutting. Thus, once the tip is set, it provides a correctly-positioned cutting edge throughout the sequence of indexing of both ends.

When both ends of the Kennametal round have become dull, it is removed from the holder, reground, and thus made ready for another double cutting cycle.

Styles 3RS and 6RS tools are described and priced in Catalog 47. Write for a copy.

The steel cluster gear shown above is a mass production item. Conventional tipped tools limited its output, because of the extensive regrinding involved, periodic adjustment required with a complex set-up, and the necessity for repositioning tools after each regrind.

Solution of this problem was achieved by the use of a distinctive type of tool, utilizing a solid Kennametal round similar to that illustrated and described at the left. The significant fact brought out on this job is the remarkable durability of Kennametal. For example:

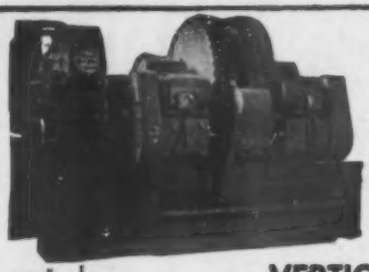
Rough turn and face Operation . . . 2,000 gears were machined with both ends of the Kennametal tip before it was reground. The tip was reground on both ends eight times, and machined 16,000 pieces during its life!

Semi-finish Operation—5,600 gears machined with both ends of Kennametal tip before regrinding. Tip was reground on both ends sixteen times, and machined 89,600 pieces!

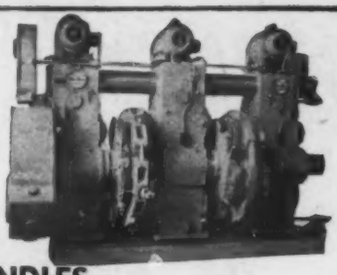
Finish Operation—3,600 gears machined per double end grind . . . 16 regrinds . . . 57,600 gears machined during the life of the tip!

The tool and the set-up on this job are unusual—complete details will be furnished on request. The performance of Kennametal is not unusual . . . it has been conclusively demonstrated that Kennametal users may get up to 6 times the output per unit of cemented carbide consumed!

KENNAMETAL
SUPERIOR CEMENTED CARBIDES
KENNAMETAL Inc., LATROBE, PA.

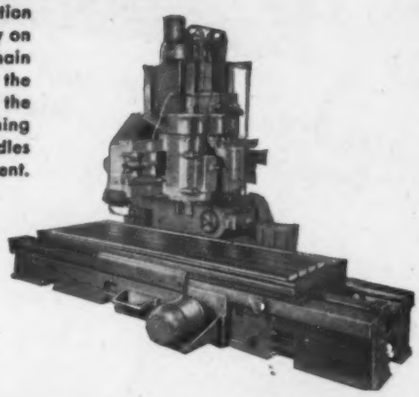


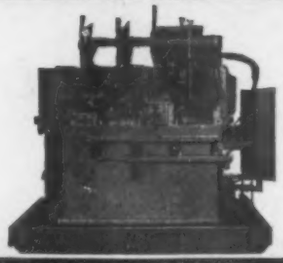
Roto-Matic MILLERS

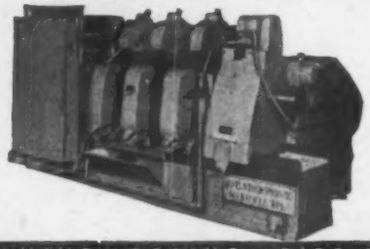


ROTARY DRUM TYPES •
VERTICALS • SINGLE AND MULTIPLE SPINDLES
PLANERS • RISE AND FALL • VERTICAL INDEXING

The ROTO-MATIC principle of continuous production insures the maximum of production and accuracy on any job to which a Miller has been adapted. Chain clamping mechanisms, where adapted, leave the operator free to load and unload parts. On the larger type Rotary Drum Type Millers finishing spindles are adjustable for toe cut. All spindles have provisions for micrometric endwise adjustment.







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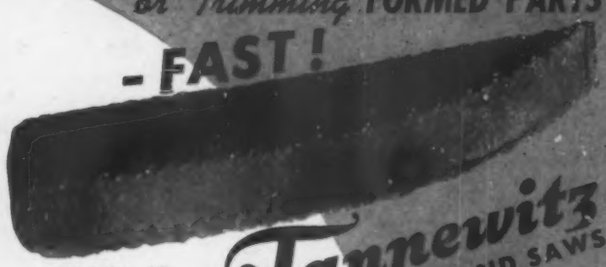
MANUFACTURERS MACHINE TOOLS, MICROMETERS AND GAGES
MILWAUKEE WISCONSIN

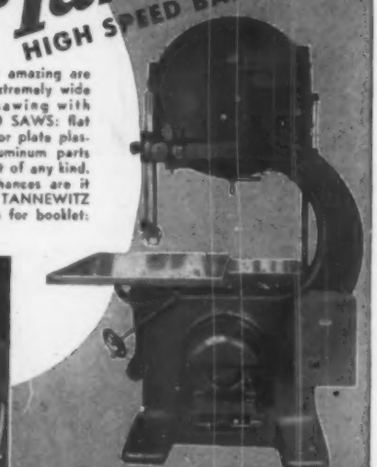
for Sawing METAL as HARD as a FILE
or Trimming FORMED PARTS
- FAST!



Actual photo of file friction sawn on Tannewitz High Speed Band Saw.

Tannewitz
HIGH SPEED BAND SAWS

Cost reductions that are downright amazing are effected in the cutting of an extremely wide variety of materials by friction sawing with TANNEWITZ HIGH SPEED BAND SAWS: flat sheets, hardened or soft steels, armor plate plastics, and many others. Formed aluminum parts can be trimmed without using a rest of any kind. Whatever your cutting problem, chances are it can be done faster and better with TANNEWITZ HIGH SPEED BAND SAWS. Write for booklet: "FRICTION SAWING."



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D.A. Stuart Oil co.
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STUART *service goes with every barrel*

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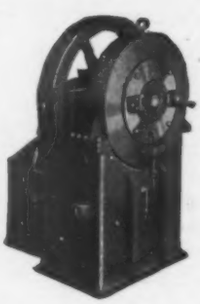
AUTOMATIC EQUIPMENT
THE V & O Press Co.
HUDSON N Y



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TORRINGTON
ROTARY
SWAGING MACHINE

— with 4000 forceful squeezing hammer blows per minute—makes metal tougher and more elastic. Send for booklet—"The Torrington Swaging Machine."

The Torrington Co., Swager Dept.
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Sterling

Vitrified and Resinoid Snagging Wheels for Extra Hours of Better, Faster Grinding

To obtain higher production and, at the same time, lower snagging costs, more and more workers and foremen find Sterling Snagging Wheels are by far the best obtainable. Careful attention to the small details of your job results in better than ordinary wheels—faster-cutting ones, too!

Under some conditions, vitrified wheels, running between 5500 and 6500 surface feet per minute are most suitable. Other jobs demand resinoid wheels operating between 9000 and 9500 surface feet per minute. The determining factor can be obtained by consultation with a Sterling engineer.

Skilled by years of experience on hundreds of different snagging jobs, the Sterling engineer can give valuable advice regarding the proper "Wheel of Industry" to use. In addition, the services of our laboratory technicians and plant engineers are yours to assist in selecting the "wheel in a thousand" your particular job needs.

May we serve you?

"THE WHEELS OF INDUSTRY"
STERLING
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Goss & De Leeuw

THE WORLD'S FINEST MULTIPLE SPINDLE

Chucking Machines

GOSS & DE LEEUW MACHINE CO.

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Made Only by Wilson

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Making hardness testing equipment is our full-time job—has been for 27 years. Wilson instruments meet a wide range of requirements and every one has the dependable, enduring accuracy that has made the "ROCKWELL" scale the universally-accepted standard.

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HARDNESS TESTER

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TURNING GRINDING MILLING

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Set of 19 does the work of 209 solid arbors. No parts to wear out and cause distortion. Sure grip on heavy work. For all bores, 1" to 7". Two types, sold singly or in sets. Used in shops the nation over to save the time lost in making or looking for solid arbors. Bulletin 1043.

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machine tools
to help make machine tools

It's generally conceded that the most critical buyers of machine tools are the machine tool builders themselves. The South Bend Lathe Works are typical.

Should you go through the South Bend plant you would see Rockford Hy-Draulic Shapers applied to many different types of work. For example, one job involves a difficult shoulder cut on a Change Gear Bracket. Two shoulders are cut at one time . . . up to a blind shoulder. Tolerances of plus or minus 0.001" are maintained. No further finish is required on the part.

Accuracy of the Rockford Hy-Draulic Shaper ram stroke in maintaining the plane and length of the cut with precision accuracy, makes it the ideal machine for the job. High cutting and return stroke speeds result in fast production and lower costs.

Take a tip from the machine tool builders . . . compare and be critical of the machines you buy. When you do this, your choice in Shapers is bound to be a Rockford Hy-Draulic. Write for complete information and Catalog 1947.

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ROCKFORD ILLINOIS

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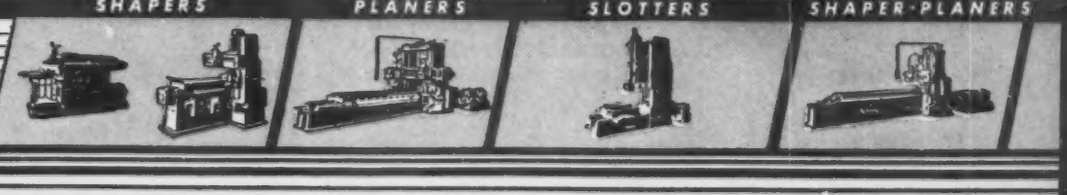
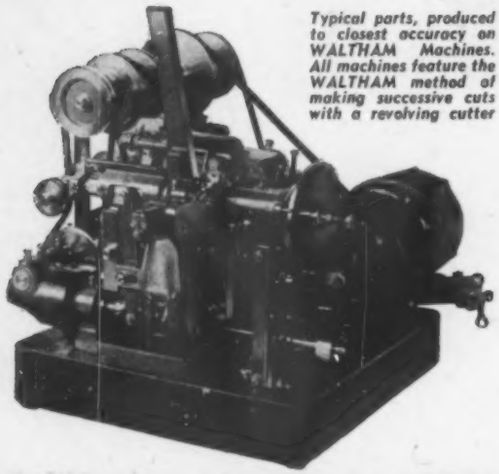
Because of Hy-Draulic design, Rockford Shapers give you speed, accuracy, and ease of operation in all types of shaper work. These elements combined mean lower costs in production or in tool room or maintenance work. Rockford Hy-Draulic Shapers are built in 12", 16", 20", 24" special, 24" and 28" sizes; Openside Shapers in 36" size.

Hy-Draulic

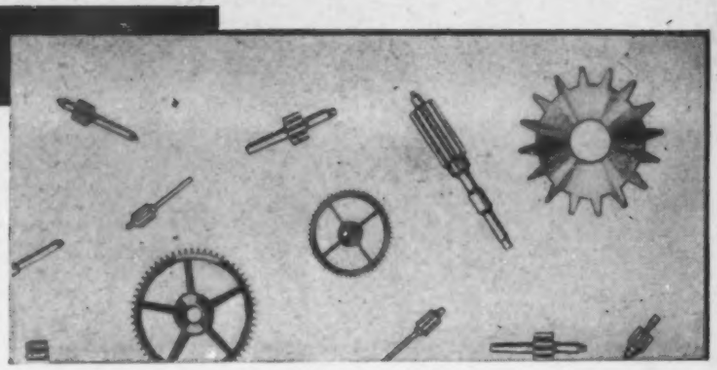


WALTHAM
PINION & GEAR CUTTING MACHINES

for precision production of fine pitch mechanisms



Typical parts, produced to closest accuracy on WALTHAM Machines. All machines feature the WALTHAM method of making successive cuts with a revolving cutter



Single-Cut Pinion Machines This machine employs one cutter. Blank is positioned and machine started by hand, all other movements being automatic.

Multiple-Cut Pinion Machines Two or three cutters on arbor of cutter spindle make successive cuts. Machine stops on completion of last cut.

Magazine-Fed Pinion Machines Provides continuous production of one kind of pinion. Magazine is loaded and all other operations including cutting and ejecting are automatic and continuous.

Gear Cutting Machines Single and Multiple cut machines equipped with special cutter swing provide the means of cutting teeth on gears up to 1½" pitch diameter and in a stack ¾" to 1" long.

Write for literature giving detailed specifications

WALTHAM MACHINE WORKS
WALTHAM, MASS.

WALTHAM TRADE MARK REGISTERED U.S. PAT. OFF.

THESE 81 JO-BLOCKS
—make 120,000 of the most accurate* Tools in the World!

(at a cost of less than 4 mills per tool—inspection standard "A")

With this popular No. 1 Set of Johansson Gage Blocks, any one of 120,000 different size gages may be made up in a few moments, in steps of .0001", from minimum size .200" to more than 12 inches. It is thoroughly practical to extend the benefits of Jo-Block precision to include inspection of close-limits production. This is particularly true of those limited-quantity jobs which might be described as "custom-production," for which permanent gaging could easily cost more than the job itself. The cost of replacing any blocks in your set that might be thus unduly worn would be negligible by comparison. Jo-Blocks are not "too good for the job"—no tool is too good for the job, if it accomplishes it better and for less money. Write for literature.

**Currently manufactured to accuracy standards of plus or minus .000002, .000004 and .000008 of an inch.*

Johansson GAGE BLOCKS

FORD MOTOR COMPANY
JOHANSSON DIVISION
3601 Schaefer Road
Dearborn, Mich.

If you have a SPECIAL PROBLEM

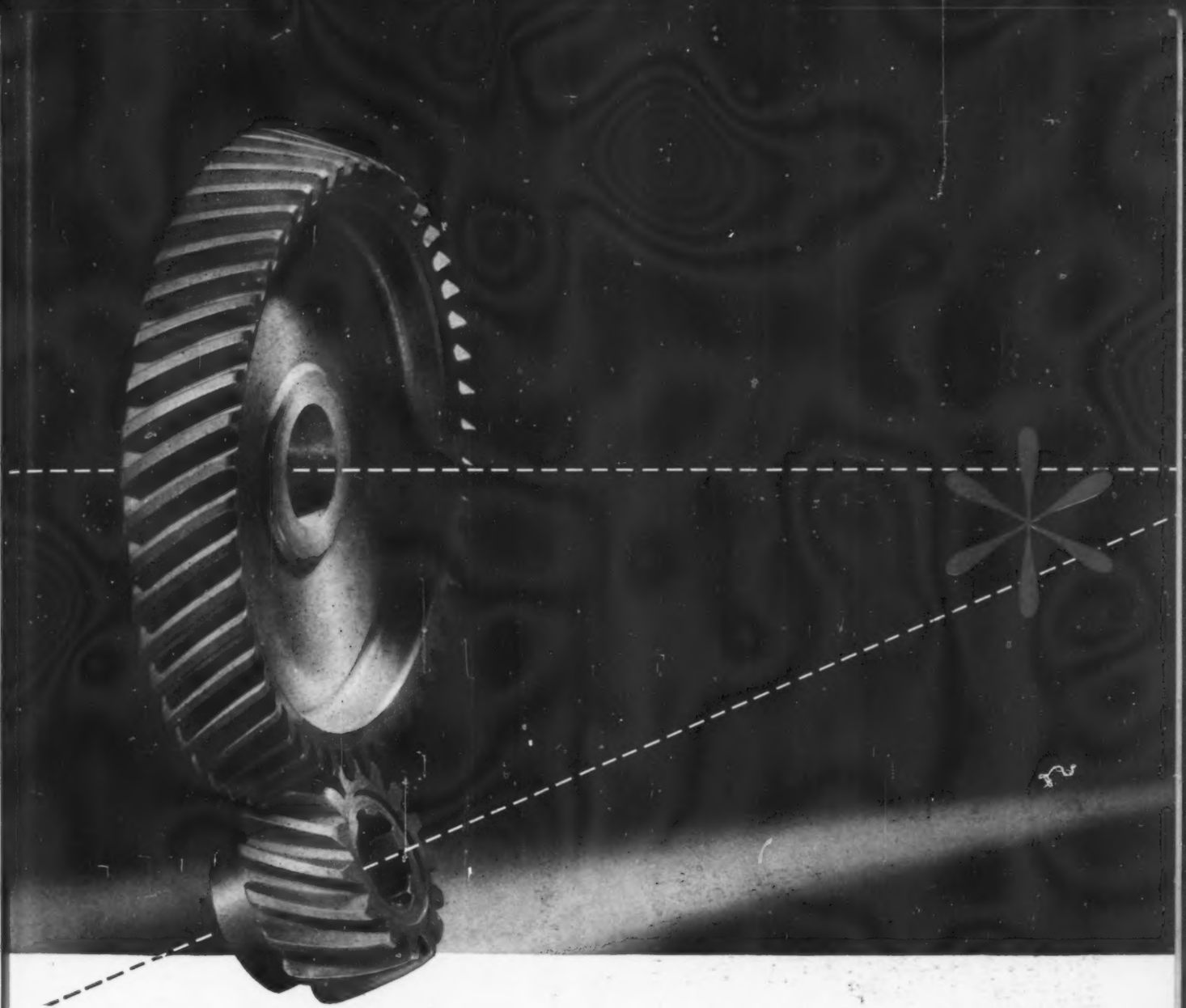
in any of these operations, where precision work is demanded and where greater production at man-hour savings is paramount—

• BORING—rough, semi-finish and finish • MILLING (special types) • STRAIGHT LINE DRILLING • UNIVERSAL ADJUSTABLE SPINDLE DRILLING • HONING • TAPPING • REAMING • COUNTERBORING • VERTICAL AND WAY-TYPE EQUIPMENT

then a Moline Multiple Spindle Specially Designed machine tool is your answer. Moline tools are ruggedly built and engineered to fit your PARTICULAR requirements, they're made to last for years, they're easy to change over to other jobs, they do better work at less cost and stand up to it longer.

For YOUR special problem, go "HOLE-HOG," write us for any information you may need.

MOLINE TOOL CO.
100 20th Street Moline, Illinois



* How to lead a horse to water

OR A HUNDRED HORSES, for that matter. Gears like these are often needed to harness a marine engine to a propeller shaft, at an out-of-the-ordinary angle.

Whether or not you ever require gears of this special type, note the mark they bear: "Double Diamond." Whatever their shape, size or application, gears that carry this stamp have one thing in common: *they're made to one set of standards.* Here's how it works:

You, a builder of machinery or equipment for transportation, mining, agriculture, or manufacturing, first decide precisely what you expect from gears – load capacity, speeds, service life, quietness–and your engineers, and ours, agree on the final specifications. Then . . . from the first gear in your order to the last, *we meet or exceed those specs.* We've been doing business this way for more than 25 years.

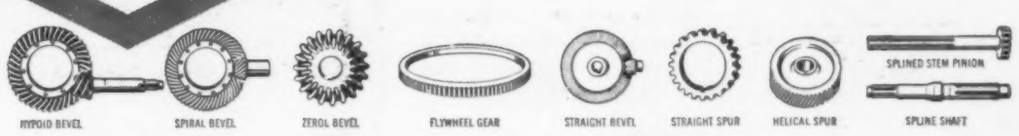
Perhaps a meeting of minds (yours and ours) would help your product development program right now. Write.

DOUBLE DIAMOND
TRADE MARK
GEARS

Made by

AUTOMOTIVE GEAR WORKS, INC.
RICHMOND, INDIANA

FOR AUTOMOTIVE, FARM EQUIPMENT AND GENERAL INDUSTRIAL APPLICATIONS



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TIMKEN

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ON ANTI-FRICTION BEARINGS ARE YOUR ASSURANCE OF *QUALITY, DEPENDABILITY* AND *PERFORMANCE* WHICH ENABLE YOU TO CUT COSTS AND INCREASE PRODUCTION

Dodge-Timken Double Interlock Pillow Block. Dodge mounts, seals and houses the bearing assembly, delivers the pillow block fully assembled ready to lock on the shaft and run at full speed and full load. This is one of the famous Dodge 30,000 hour line, covering a wide range of industrial bearing requirements, and promptly available from Dodge distributors' stocks.

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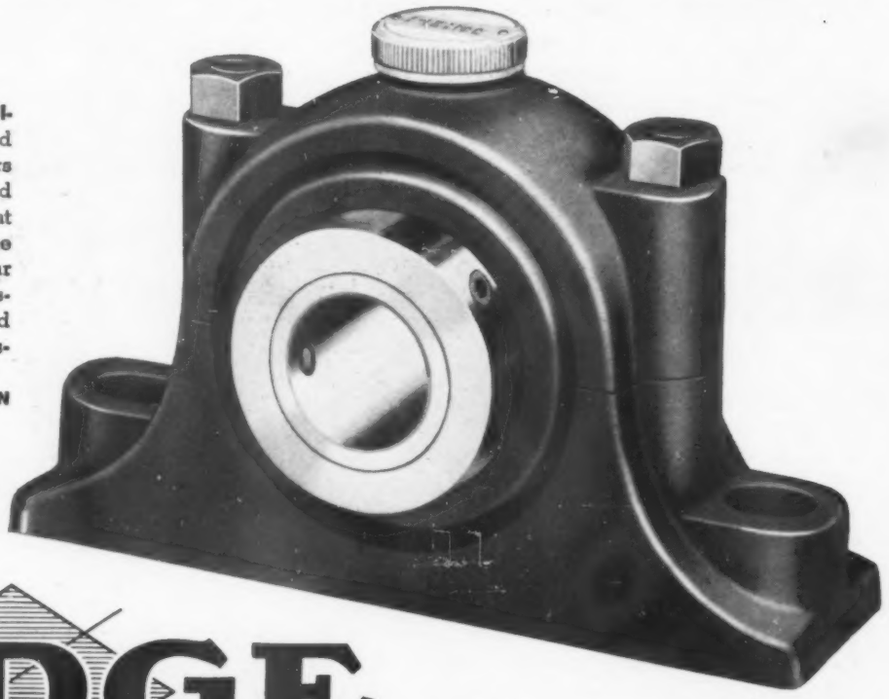
Mishawaka, Indiana



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CALL THE TRANSMISSIONEER
your local Dodge distributor, for news of latest developments in power transmission equipment. Look for his name in your classified phone book under "Power Transmission Equipment."

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NAME PLATES

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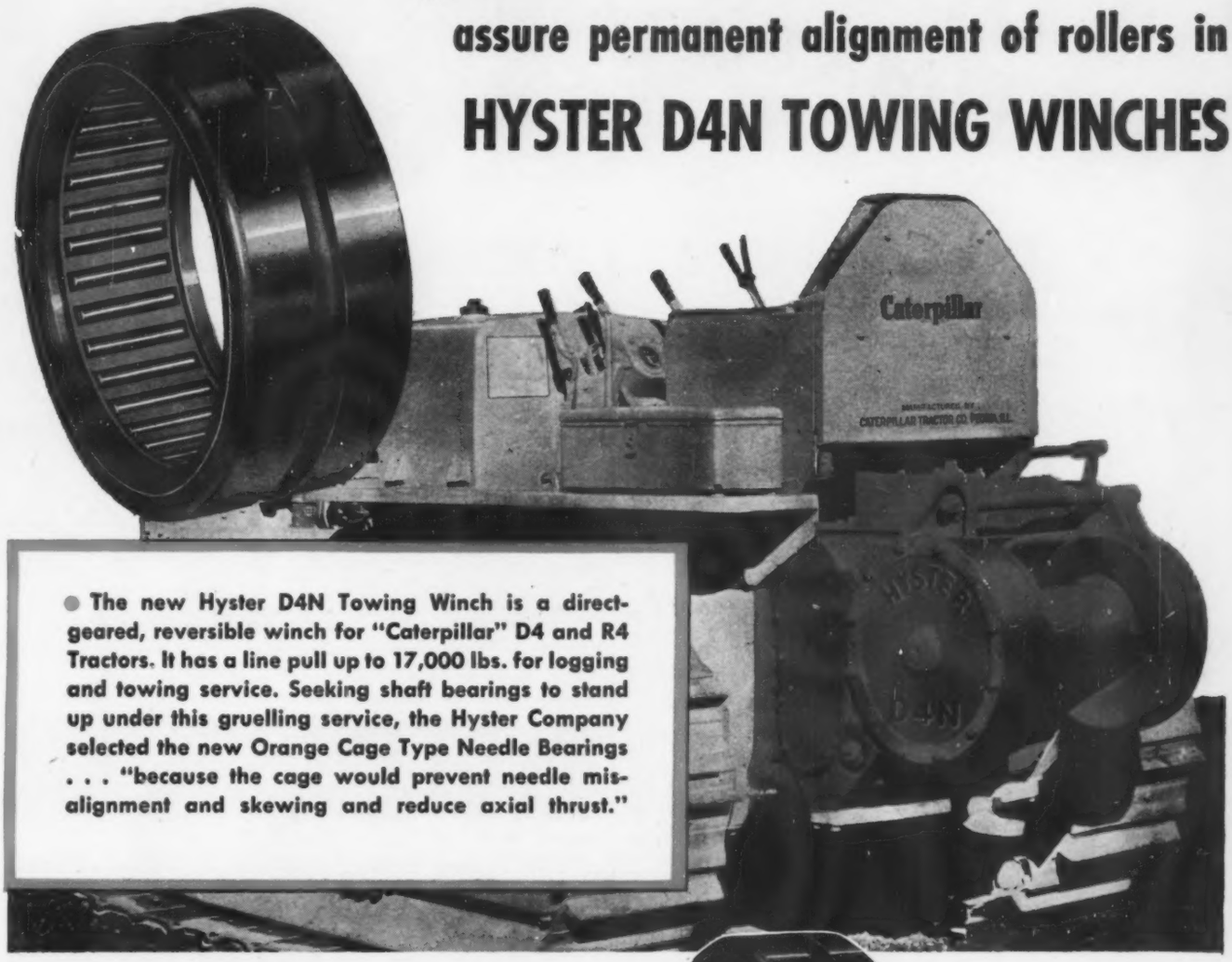
ETCHING COMPANY OF AMERICA, 1520 MONTANA STREET, CHICAGO 14, ILLINOIS

ORANGE *Cage Type* NEEDLE BEARINGS

assure permanent alignment of rollers in

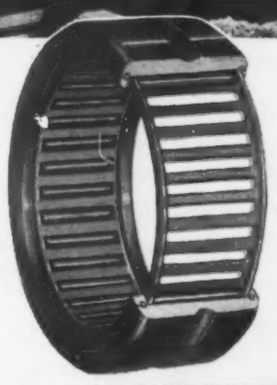
HYSTER D4N TOWING WINCHES



● **The new Hyster D4N Towing Winch is a direct-geared, reversible winch for "Caterpillar" D4 and R4 Tractors. It has a line pull up to 17,000 lbs. for logging and towing service. Seeking shaft bearings to stand up under this gruelling service, the Hyster Company selected the new Orange Cage Type Needle Bearings . . . "because the cage would prevent needle misalignment and skewing and reduce axial thrust."**

THE new Orange Cage Type Needle Bearings are especially adapted for spindles and high speed applications where requirements are exacting. They are unusually successful in vertical or overhung applications and are less affected by misaligned mountings. The cage design provides permanent alignment of rollers—less internal friction—smoother running—longer life hours expectancy.

Why not investigate today? Our engineers are glad to consult on any application. Send coupon for Engineering Data Folder showing construction, advantages, capacities and range of sizes available.



● **Cross-section shows square-end rollers in coined pockets of free-rolling cage, made of anti-friction, non-ferrous metal. Internal clearances can be controlled to meet exacting specifications. All rollers and raceways are "Pentrate" finished to reduce friction, aid lubrication, increase durability and resist rust or corrosion.**

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Mail Coupon for Engineering Data

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Please send me Engineering Data on new Cage Type Needle Bearings.

Name.....Title.....
Company.....
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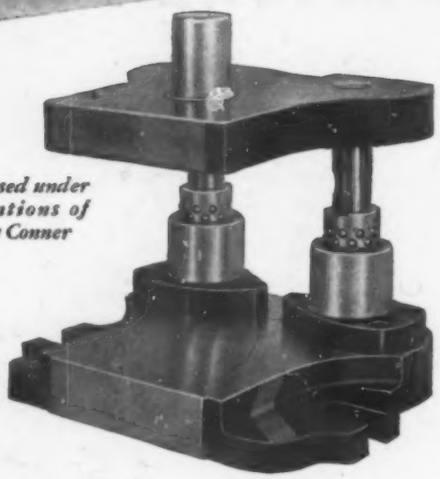
LEMPCO PRECISION ANTI-FRICTION DIE SETS OFFER YOU ALL OF THESE 6 ADVANTAGES



Licensed under inventions of Guy Conner

Lempco's Pre-loaded Anti-Friction Guide Pin Bearings absolutely prevent any lateral motion between pins and bushings. As a result, they provide the following 6 advantages. Check them carefully. Each of them will play an important role in assuring the quality of your products and reducing costs.

1. **Perfect alignment of punches and dies.**
2. **Precise parallelism of punch and die holder.**
3. **Die sets can be opened and closed by hand . . . saves up to 60% of die assembly time.**
4. **Eliminates galling or seizing of pins and bushings which reduce costly downtime.**
5. **Insures greatly increased die life.**
6. **Positively eliminates all lubrication problems.**

FREE: *Write for fully illustrated catalog, that is packed with factual evidence that proves all of the above advantages.*

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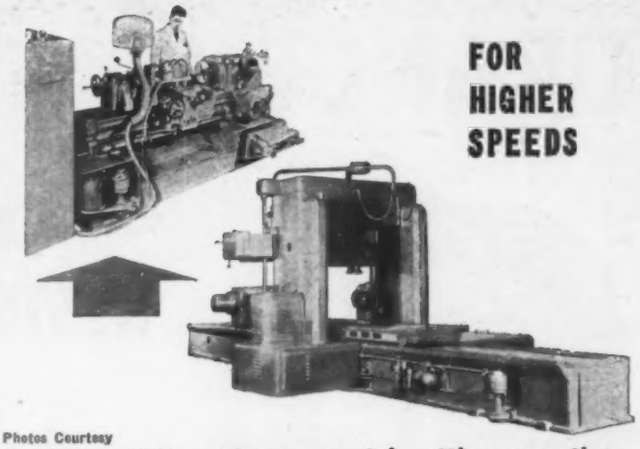

FOR HIGHER SPEEDS

Photos Courtesy
The Monarch Machine Tool Co., Sidney, Ohio
The Ingersoll Milling Machine Co., Rockford, Illinois

in your metal cutting operations specify . . .

RUTHMAN GUSHER
COOLANT PUMPS

Yes, Ruthman Gusher Coolant Pumps can help you get higher speeds, increased production. Split-second control of coolants from a trickle to full volume assures you of the right temperature for your work. When you specify Ruthman Gusher Coolant Pumps, you know that you have the right coolant flow when you want it, where you want it.

Above left is shown a Monarch Magna-Matic Lathe all electrically controlled, equipped with a Model 11022 Short Ruthman Gusher Coolant Pump. To the right is is an Ingersoll 48x48x16' Four Head, Type A 30 Adjustable Rail Milling Machine, equipped with a 11022-E, ½ HP Ruthman Gusher Coolant Pump.

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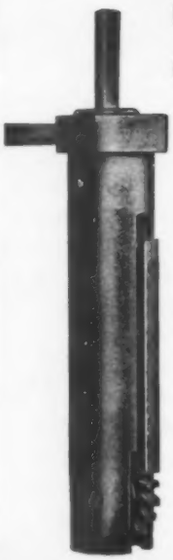
THE RUTHMAN MACHINERY CO.
1818 Reading Road Cincinnati, Ohio

NATIONAL KEYSEATING MILLER

the tool that converts drilling machines into key-seaters and saves time and money



• With this modern tool you can handle keyseating jobs not suitable for keyseating machines on any of your drill presses or radials. Keyseats with parallel sides, accurate in depth and in perfect alignment with bore axis are assured.

The National Keyseating Miller mills, keyseats in one cut. It can be used on offset holes and blind holes. Work clamping is unnecessary. We also manufacture oil-grooving millers.

Made in twenty-seven different diameters from ½" to 3½". Several widths of cutters can be used in each size.

WRITE TODAY FOR OUR NEW CATALOG NO. 16

NATIONAL MACHINE TOOL CO.
CINCINNATI, OHIO

POP'S SCHOOL of FILING
DON'T DO THAT!
FILE-FLINGIN' FREDDIE! WHEN HE CAME OFF TH' ASSEMBLY LINE, TH' STORK FORGOT HIS BRAINS!
HE KIN TAKE TH' BITE OUTA MORE FILE-TEETH THAN A STUDENT DENTIST WITH A BUZZ-SAW! POP'LL MASSACRE 'IM!

"NO EXCUSE FOR FILE ABUSE"

—says Pop the Foreman

ONCE AGAIN manufacturing competition is getting keen. There's the problem of keeping production costs and profit margins in line with the prices consumers are willing to pay. All of which means putting *Maximum Efficiency* to work in every department, in every manufacturing operation, and in the use of every tool.

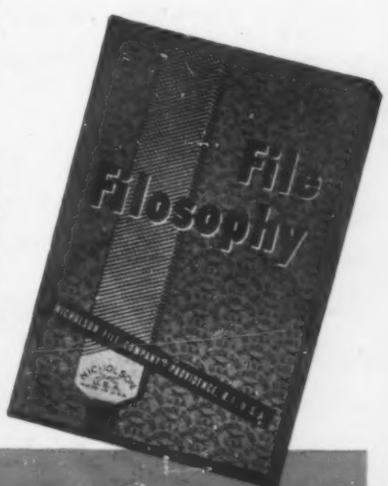
On mass-work especially, the proper use and care of files enters heavily into savings in man-hours, materials and new-file costs. Here are some timely suggestions which it will pay to post in the tool-room, on shop bulletin boards, and over work benches:

- **Don't throw files among other tools or objects.**
- **Don't lay files on top of, or stack them against, one another. Keep them separate—either standing with their tangs in holes or hung on a rack by their handles.**
- **Keep files in a dry place so rust will not corrode their cutting edges.**
- **Keep files clean of filings or "chips." After every few strokes tap the file on wood (not on metal) to loosen the chips. Files should also be brushed frequently with file brush or "card."**
- **Never "tear" into the work with too much pressure on the forward, or cutting, stroke.**
- **Never "drag" the file back under needless pressure.**
- **Use *The right file for the job.***

The better the file the greater the reward of care. Nicholson and Black Diamond files are of the highest quality—made to serve long under normal circumstances, still longer under proper use and care. For your file needs, contact your industrial distributor.

FREE BOOK...

For further helpful information on kinds, use and care of files, write for a copy of the famous 48-page Nicholson book, *FILE FILOSOPHY.*



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REPUBLIC'S rings with "THAT UNSEEN EXTRA QUALITY" cost no more.

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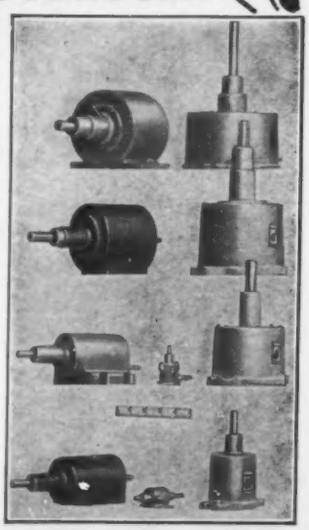
Progressive Production Managers make sure there's always a supply of simple, adaptable, single-acting Mead Air Cylinders on hand in the tool room —to help solve tooling problems quickly, inexpensively. Available in numerous vertical or horizontal mountings and in a wide range of sizes all featuring spring-return action. Write for new Mead Air Power Catalog describing single and double acting Cylinders, Valves, Presses, Clamps, Work Feeders, Vises, Impact Hammers, Collet Fixtures and other air-operated devices.



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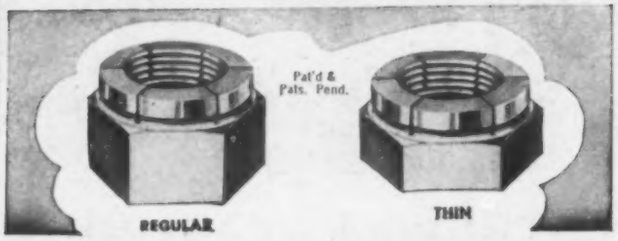

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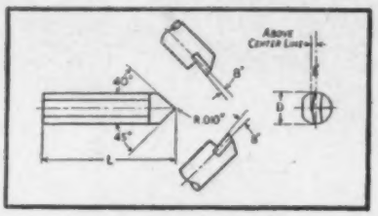
STANDARD PRECISION CARBIDE TIPPED BORING TOOLS



. . . Furnished in Any Standard Manufacturer's Grade

Standard S-3 Solid

D+.000	Above	5/32	1/64
—.001	E	3/16	1/32
3/32	1/64	¼	1/32
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These tools are time and money savers, economical to use, and consistent in performance. They retain their cutting qualities over long periods of time and can be depended on for accurately sized and smoothly finished holes. High cutting speeds can be maintained without frequent shutdowns or interruptions for tool changes.

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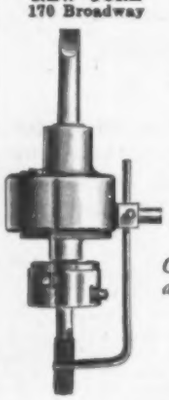

Size	Taps Exact Size Up to
No. 00 H.S.	1/16"
" 00	3/16"
" 0	1/8"
" 1	3/8"
" 2	5/8"
" 3	3/4"
" 4	3/4"
" 5	3/4"

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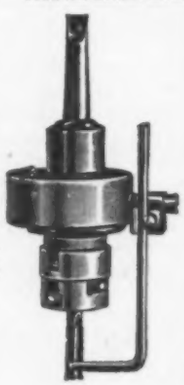

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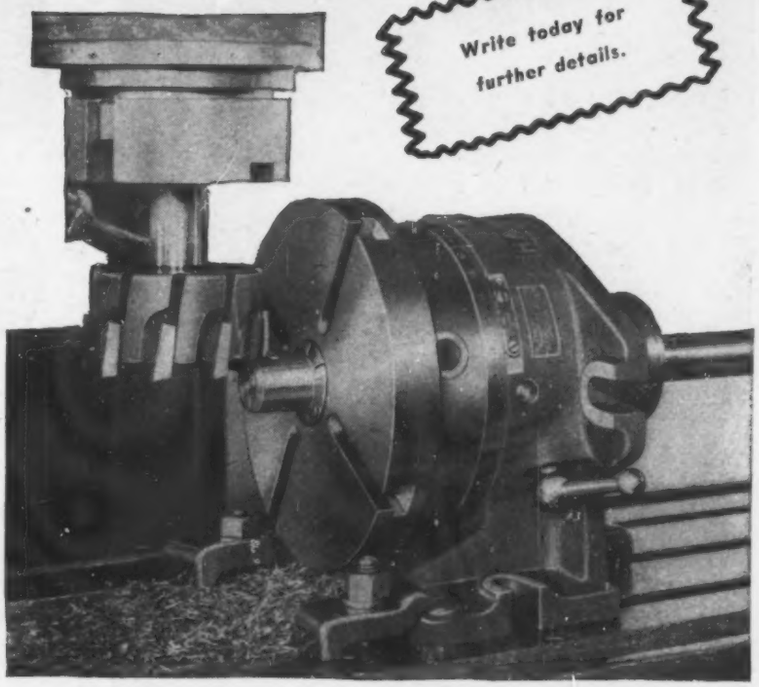

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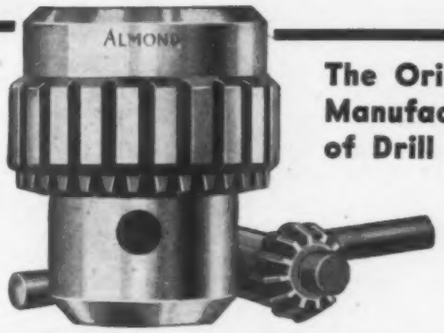
Almond Drill Chuck



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to meet a specific demand for a light duty *quality* joint where cost is a prime factor.

Utilizing an ingenious patented design, Curtis Engineers have developed a ball-type universal joint that combines *reduced friction* with *lower production costs.* These lower costs are being passed on to the user.

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Available now in ½" and ¾" sizes — other sizes in production.

DEPT. B-4

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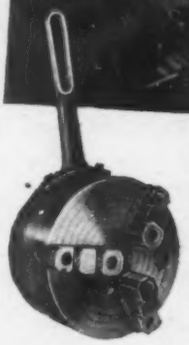

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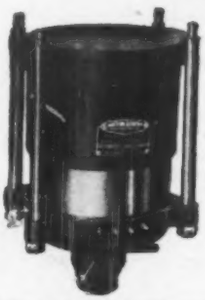

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Self-contained unit, quickly installed on any punch press.

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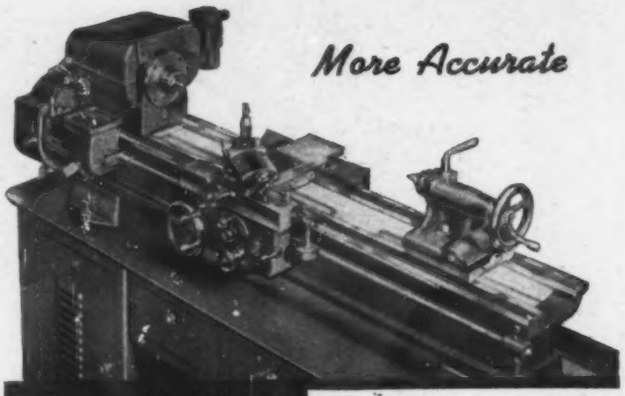

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New SHELDON
TRB-S56 Precision Lathes

There is a degree of accuracy built into the new $1000.00 Sheldon TRB-S56 Precision Lathe heretofore found only in a few of even the most costly lathes. For example, spindle bearings are "Zero Precision," the very finest, closest tolerance tapered roller bearing manufactured. The heavily strutted, 1-piece bed has 2 V-ways and 2-flat ways ground on special bed grinder and held to the closest tolerance of lateral and parallel alignment.

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The TYPE S "PRODUCTION" IS AN IDEAL MACHINE FOR CYLINDRICAL POLISHING OR STRAIGHT LINE FINISHING

Cylindrical work ¼" to 1" diameter may be fed through the machine automatically by the Centerless Feed Attachment. No centering or chucking—just feed automatically. Assures a fine uniform finish at high speed. Flat or irregular work can also be finished on the Type S by hand manipulation. Flat surfacing bed can be quickly removed, leaving abrasive belt flexible for finishing irregular shapes. Change from vertical to horizontal position can be made in less than a minute.

Write for illustrated Literature

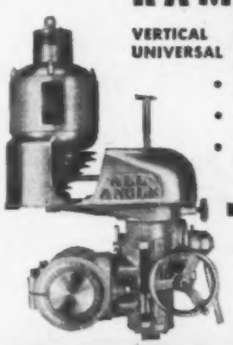
Production
MACHINE COMPANY, GREENFIELD, MASSACHUSETTS, U.S.A.

YOU DON'T HAVE TO STAND ON YOUR HEAD
. . . to do a difficult job on a
FRAY Miller!

Precision

RAM TYPE NO. 7-B
VERTICAL UNIVERSAL **MILLING MACHINE**

- Flexible
- Sturdy
- Universal
- Easy to Operate
- One set up
- All angles quickly obtained



- Four sizes
- Four types
- Adaptable to all Milling Machines

For further information write Dept. A

WORLD DISTRIBUTORS
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You get supplies and equipment the fastest possible way when you specify Air Express. This speedy service makes hay out of shipping time — delivers you what's needed in hours instead of days.

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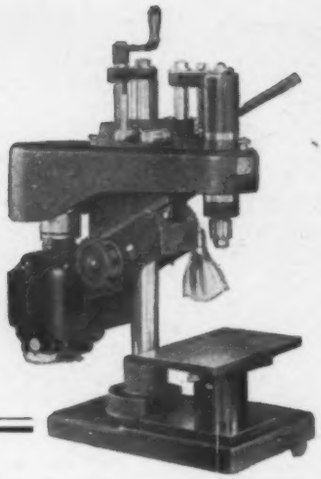
AIR EXPRESS

AIR EXPRESS — GETS THERE FIRST

Fastest delivery—at low rates

Engine parts (36 lbs.) picked up at Portland, Ore., factory late on 10th. Delivered to Los Angeles consignee **821** miles away, 9 AM on 11th *in time*. Air Express charge—**$8.84!** Other weights, any distance, similarly inexpensive and *fast!*

1927— 20TH YEAR OF GETTING THERE FIRST! — 1947



Spare a moment?

Your job requires production of small, precision holes! .004" to 5/16" in any drillable material? Take a tip from other precision manufacturers. From watch, clock and instrument makers. Investigate the Hamilton Verimatic, Super Sensitive, Variable Speed Drilling Machine. 80% of present Hamilton installations are repeat orders. That's proof of its usefulness! Spare a moment now to investigate. It may well mean dollars-in-your-pocket. Clip this ad, attach to your letterhead and mail. We will send our Bulletin V-47. And V-47 will give you the whole story. Do it now!

THE Hamilton TOOL COMPANY

SUPER SENSITIVE DRILLING MACHINES · TAPPING MACHINES · PORTELVATORS

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Mark Metals with Force STEEL TYPE

This assortment of interchangeable type, made of the finest Sheffield tool steel, fulfills most shop metal-marking problems. Consists of hardwood case containing generous fonts of letters and numerals, type holder, tweezers, and locking wrench. Press-type holders also available.

Send for literature and catalog of the famous FORCE line of metal marking and numbering equipment for industry.

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ARE YOU STILL AN ACTIVE PARTNER . . .

in this "7½ billion-a-year" success?

NEVER was there a partnership like the nation-wide brotherhood of volunteers who have helped sell, advertise, and promote sales of U. S. Savings Bonds! Their program is the greatest sales operation at the lowest cost in history.

Your continued support in promoting the Payroll Savings Plan will help "America's partnership" this year to repeat or surpass last year's four-star performance, in which sales of Savings Bonds were 7½ billion dollars—*exceeding redemptions by far more than a billion!*

So keep up the splendid work—keep on telling and selling your employees the advantages of Payroll Savings: (1) ease; (2) regularity; (3) safety of investment; (4) security for the individual and the nation; (5) $4 for every $3 at maturity! And, remember, people with a stake in the future are the most stable, most productive employees.

For any help you need in conducting the Plan, call on your State Director of the Treasury Department's Savings Bonds Division.

New Savings Bonds Plan won't affect the P.S.P.

THE Treasury Department and the banks of America are making it possible for farmers, doctors, and other self-employed people to participate in "automatic" Bond buying by special arrangement with their banks. This extension of the Savings Bonds program is not a partial payment plan and is intended *only* for people who are not in a position to take advantage of the Payroll Savings Plan.

The Treasury Department acknowledges with appreciation the publication of this message by

American Machinist

This is an official U.S. Treasury advertisement prepared under the auspices of the Treasury Department and The Advertising Council.

TWELVE HUNDRED HANDS TO FIND THE FACTS

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Provide a steady flow of work for your plant through advertising your facilities and experience in this section—where it will be seen by more than 28,000 metal-working executives representing 90% of the purchasing power of the industry.

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For information on rates, write

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AMERICAN MACHINIST

330 W. 42nd STREET

NEW YORK 18, N. Y.

FLAME CUTTING
WELDED STEEL FABRICATION
Machine frames and bases, gears, flywheels, pulleys, special shapes.

FOUNDRY — MACHINE SHOP
With facilities for normalizing and sandblasting.

SPECIAL ATTENTION TO RUSH OR REPAIR JOBS

Send prints for quotation

J. B. LUND'S SONS
CHEBOYGAN MICHIGAN

WANTED
PRODUCTION AND CONTRACT WORK

for Heavy Duty Equipment; Turret Lathes, Heavy Duty Lathes, Vertical and Horizontal Boring Mills, Drill Presses, Box and Open Side Planers, Welding and Fabricating Equipment.

Operating with low overhead, our quotations on your requirements for production or job contract will be very attractive.

ALFRED STAUFFER MACHINE SHOPS
HONEY BROOK PENNA.

LARGE CHUCKING MACHINES
(16" 8 spdl. Bullards, (5))

Fully tooled, ready to go! Latest design, with sufficient space for mfg. & assembling of allied parts in Detroit. Interested in renting or leasing to reputable concern, or, running on 50-50 investment basis.

CW-1375, AMERICAN MACHINIST
520 N. Michigan Ave., Chicago 11, Ill.

PATTERNS in WOOD and METAL
For All Kinds of Castings, Large or Small
MATCH PLATE WORK A SPECIALTY
Put your pattern problems up to us — we will take care of them.
GENERAL PATTERN WORKS
2233 Buck Street Cincinnati, Ohio

PRECISION MACHINE WORK

Mold plates, Cavity plates, Rubber molds, Hydraulic pump units and parts to specifications. Die plates for injection molding, Strain rods. Production work, turret lathe, exceptional Engine lathe operations, Milling & Drilling. Machines built to specifications. Prints will receive prompt quotations.

MADISON MACHINE COMPANY
119 E. 22nd ST., PATERSON, N. J. LA 5-0838

SCREW MACHINE PRODUCTS

Multi Spindle ¼" to 2⅜" Diameter. Punch Presses to 50 Ton. Turret and Engine Lathes. All secondary operations, Drill Press, Riveting, & Soldering, Packaging & Assembling.

Send us your prints or samples for quotations.

METOMIC CORP.
2944 W. 26th St., Chicago 23, Ill., Bishop 2133

CONTRACT
Machine Parts Manufacturing

Open Time on Latest Type Equipment:

- Production Automatic Milling Machines and Drill Presses
- Turret Lathes, 2¼" Bar Capacity
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Modern, fully equipped facilities for designing and building Special and Automatic Machinery, Metal Stamping Dies, Special Tools, Jigs & Fixtures. Large assembly floor space in modern steel and brick building.

Inquiries Invited

PHILIP H. BUEHRLE & SON, INC.

Plants	*Office*
SOUTH RIVER, N. J.	SPOTSWOOD
SPOTSWOOD, N. J.	NEW JERSEY

Established 1930

CONTRACT MACHINISTS MANUFACTURERS

Let us quote on the machining of your parts or complete assemblies.

Also

Metal fabricators—All types of welding, flame cutting, on a production basis. Your prints and specifications will receive prompt attention.

KOKOMO MACHINE CO.
120 WEST MONROE STREET
KOKOMO, INDIANA

SEND B.P. FOR
MFG. COMPLETE ASSEMBLIES
Tool—Jigs—Dies
Screw Machine and Turret Lathe Work
Stampings—Gears
POSSY'S TOOL & MFG. CO.
51 Meadowbrook Buffalo 6, N. Y.

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(Not available for equipment advertising)

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POSITIONS WANTED (full or part-time individual salaried employment only), ½ above rates.

PROPOSALS, 50 cents a line an insertion.

INFORMATION

BOX NUMBERS in care of any of our New York, Chicago or San Francisco offices count 10 words additional in undisplayed ads.

DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals.)

DISPLAYED RATE:

The advertising rate is $8.00 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches to a page. A.M.

NEW ADVERTISING received by 10 A.M. August 22nd will appear in the issue of September 11th subject to limitation of space available

SALES ENGINEER

Large and well established Indiana firm distributing Machine Tools, Small Tools, Steel and Electrical Equipment wants high grade man to sell to industrial plants in middle west in established territory. Must be between 25 and 40, well educated, preferably engineering training, and have proven sales experience in one or more of these lines. Must be capable of meeting top executives as well as shop superintendents and engineers. Substantial salary plus drawing account against commissions. Your reply should provide complete details, qualifications and references. Our employees know of this ad.

P-1652, AMERICAN MACHINIST
520 N. MICHIGAN AVE. CHICAGO 11, ILL.

POSITION VACANT

MECHANICAL ENGINEER for plant layout-special machine design-production processes in mid-western grinding wheel plant. Experience desired, but not necessary in particular line. P-1607, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

EXPERIENCED FIXTURE designer wanted. Good opportunity for high grade man. Give full particulars as to experience and salary desired. Application will be treated as strictly confidential. Consolidated Machine Tool Corp., 565 Blossom Road, Rochester 10, N. Y.

SELLING OPPORTUNITY OFFERED

TOOL ENGINEER ad salesman wanted for Eastern territory, salary and commission, full resume first letter. SW-1666, American Machinist, 330 W. 42nd St., New York 18, N. Y.

REPRESENTATIVE WANTED

REPRESENTATIVE WANTED by important diamond tool manufacturer and industrial diamond dealer for each of the following territories: 1) Michigan 2) greater Chicago 3) Wisconsin 4) Rockford, Ill. 5) New Jersey. Present activity or experience in line or in sale of grinding wheels, machine tools or precision tools preferred. COMMISSION RW-1678, American Machinist, 330 W. 42nd St., New York 18, N. Y.

EMPLOYMENT SERVICE

SALARIED POSITIONS $2,500-$25,000. This thoroughly organized confidential service of thirty-seven years' recognized standing and reputation carries on preliminary negotiations for supervisory, technical and executive positions of the calibre indicated through a procedure individualized to each client's requirements. Retaining fee protected by refund provision. Identity covered and present position protected. Send only name and address for details. R. W. Bixby Inc., 266 Dun Bldg., Buffalo 2, N. Y.

POSITIONS WANTED

SUCCESSFUL SALES engineer with 15 years' experience selling Machine Tools. Excellent engineering and manufacturing background. Severing present position as Sales Manager. Location open, now residing Los Angeles. PW-1342, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

DESIGN ENGINEER—with 20 years' experience in the design and development of machine tools and single purpose, multiple station, special machinery for automotive and general industrial production desires connection with well established company. Availability approx. 30 days. PW-1228, American Machinist, 330 W. 42nd St., New York 18, N. Y.

SHOP SUPERINTENDENT thoroughly familiar with all phases metal fabrication, both jobbing and production, plant maintenance, new installations and repair, long practical experience, wants permanent opportunity, as master mechanic, assistant or machine shop superintendent preferably Wisconsin, Minnesota, or Michigan. Twelve years paper mill maintenance and repair, familiar with and can keep production records, job evaluation, etc. Married, 45. PW-1610, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

ENGINEER—37 PRODUCTION, development or sales. Ten years' engineering experience on tools and machinery. Thorough practical and theoretical knowledge Vicinity N.Y.C. PW-1520, American Machinist, 330 W. 42nd St., New York 18, N. Y.

ENGINEER-DESIGNING, light machinery, tools, dies, all types and process. PW-1602, American Machinist, 330 W. 42nd St., New York 18, N. Y.

RESIDENT CONSULTING Engineer manufacturing procedures and methods. Excellent record of accomplishment in the design and development of products and the adaptation of tooling and production facilities. Can organize and follow-up work to have it completed in satisfactory and economical manner. PW-1016, American Machinist, 330 W. 42nd St., New York 18, N. Y.

SELLING OPPORTUNITIES WANTED

ESTABLISHED MANUFACTURERS' Representative calling on mill supply, power transmission, distributors need one or two lines for Texas, Louisiana. Replies answered. 2848 29th Street, Port Arthur, Texas.

EXPERIENCED SALESMAN who has had a wonderful record selling to the automotive industry in Detroit wants to represent manufacturers of mechanical devices or equipment on the West Coast will call on automotive, aeronautical and kindred manufacturers. SA-1491, American Machinist, 68 Post Street, San Francisco, Cal.

SALES REPRESENTATION for Western Michigan. Manufacturer's agent desires line metals, tools, materials or intangibles. Nine years' practical toolmaking, 17 years' sales experience. SA-1490, American Machinist, 520 N. Michigan Ave., Chciago 11, Ill.

PART-TIME WORK WANTED

MANUFACTURES INDUSTRIAL engineering service in all phases available to 2 or 3 concerns not regular full time. Follow up your jobs, and renders. Time study and check your jobs, expedite your work and material, contact customers, investigations, full reports. Fifteen years up with outstanding firms. Age 40. Travel Penna., N. J., N. Y. Delaware—reference PTWW-1544, American Machinist, 330 W. 42nd St., New York 18, N. Y.

BUSINESS OPPORTUNITY

U. S. PAT. No. 2391550;

Canada Pat. No. 427280; Pats. Pend. Sweden. British Manufacturers wish to enter agreements, or dispose licenses, for the purpose of exploiting a range of Dead-length Super-grip Rapid Collet Chucks. Jigs, tools, and working drawings; material specs., etc., upon completion. Write: —The Cope Chuck & Eng. Co. Ltd., 40/42, Job's Lane, Coventry, England.

PATENT ATTORNEY

Patent and Trade-Mark Practice

before U. S. Patent Office Validity and Infringement Investigation and Opinions Booklet and form "Evidence of Conception" forwarded upon request Lancaster, Allwine & Rommel, Registered Patent Attorneys, Suite 453, 815-15th Street, N. W., Washington 5, D. C.

WANTED

ANYTHING within reason that is wanted in the field served by American Machinist can be quickly located through bringing it to the attention of thousands of men whose interest is assured because this is the business paper they read.

WOOD & METALWORKING MACHINERY

International Sales Service having established machinery dealers in most foreign countries is seeking representation for additional lines of wood—metalworking and allied machinery, and tools.

RA-1505, AMERICAN MACHINIST
330 West 42nd St., New York 18, N. Y.

MANUFACTURER'S REPRESENTATIVE in INDIA — BURMA

Well established representative desirous of contacting leading American manufacturer interested in representation and distribution in India and Burma. Excellent bank references.

P. K. PATEL & CO.
P. O. BOX 88, BARODA (INDIA) CABLES PIKE

Outstanding Manufacturing Management Executive

Competent seasoned mechanical engineer, seeking a permanent connection with a live progressive organization.

Varied experience includes thorough knowledge and capacity for materials management, maintenance, mass precision production and jobbing work, process planning, tool design, tool making, plant layout, assembly operations, forge shop, stamping and press room, grey iron and malleable foundries.

Details and references furnished on request to responsible parties stating their requirements. Address reply to

PW-1088, AMERICAN MACHINIST
520 N. Michigan Ave., Chicago 11, Ill.

REPRESENTATION AVAILABLE

Established Sales Engineering Organization now representing a nationally known Precision Gear Company in the New York-New Jersey Metropolitan Area, is desirous of adding additional allied lines such as bearings, forgings, die castings. Representatives are graduate engineers, with practical shop and engineering background.

RA-1677, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

WANTED

WANTED—THREAD ROLLER

Have immediate use for ¼" or ⅜" capacity Hopper Feed Machine.

G. B. DUPONT CO., INC.
5081 Delnmore Rd. Birmingham, Michigan

EVERY ITEM GUARANTEED AS REPRESENTED

FALK FOR DEPENDABILITY IN REBUILT MACHINERY

AUTOMATICS

2—#00 Brown & Sharpe Full Automatic, Standard Speed

1—1¼" Cone 4-spindle Automatic, Motor Driven, Threading Spindle

1—#515 National Acme 9/16" 4-spindle Automatics, complete

LATHES

10"x24" Logan Q.C.G. Lathes (new)
14"x6' Hendey Yoke Head
14"x6' Rockford Cone drive
16"x6' Lodge & Shipley Geared Head, M.D.
16"x8' Monarch Geared Head Lathe
18"x10' American, Geared Head, Taper
18"x6' American Q.C.G. motor drive
20"x10" American Q.C.G. motor drive
20"x11' Schumacher-Boye, M.D.
24"x10' LeBlond Quick Change Gear
26"x18' Bridgeford geared head
28"x10' Davis cone driven
32"x16' Bridgeford geared head
20"x8' Lodge & Shipley, motor drive
24"x22' Lodge & Shipley, G.H.M. drive
24"x36' New Haven, M.D.

TURRET LATHES

4—#4 Warner & Swasey Hand Screw Machines, arr. Motor Drive
2—#4 Warner & Swasey Universal Turret Lathe, Motor Driven
16" Warner & Swasey Brass Lathe
#2A Warner & Swasey Universal
#3A Warner & Swasey Universal, motor drive
#4 Foster Universal Turret Lathe
3—Morey #2G Geared Head Turret Lathe, motor drive (late model)
2—Simmons #2 (microspeed) Turret Screw Machine (late model)
Bullard 42" Vertical Turret Lathe

MULTIPLE DRILLS

Natco #12 Arranged for 20 spindles
Natco #D6, 24 spindles, M.D. late type
Natco #D5, 14 spindles, M.D. late type
Fox #15, 54 spindles, M.D.

GRINDERS

Blanchard #16 Vertical Rotary Surface Grinder, motor drive
Pratt & Whitney 14" x 36" Vert. Surface Grinder, motor drive
12" No. 22 Heald Rotary Surface Grinder
16" Persons-Arter Rotary Surface Grinder
1—Seybold 96" Knife Grinder
Oliver of Adrian Drill Grinders
Cincinnati Centerless Grinders #2 M.D.
#12 Greenfield Internal Hydromatic Grinder, sizematic type
#2 Brown & Sharpe Surface Grinder
#70 Heald Internal Grinder
#60 Heald Cylinder Grinder
10"x18" Norton Cylindrical
2—Cincinnati, #1½ Tool & Cutter Grinders

FOUNDRY MACHINES

2—#0 Johnson & Jennings, Jolt Squeezer Draw Pattern, 15"x21" Table
2—#342 Osborn Jolt Rollover Pattern Draw Moulding Machines, 23x38" Table
2—SPO Hand Rollover Power Draw Moulding Machines complete with run-out cars 22½"x60"
1—#602 Osborn Jolt Rollover and Pattern Draw, jolt cap. 900#, 36" flask length.
1—Tessmer, Sprue Cutter, 1¼" square, capacity

SHEARS & METAL WORKING

Cerweco 8'x14 ga. Brake (NEW)
Lennox Splitting Shear, ¾" cap.; 8' throat
Lennox Bevel Shear, ¼" cap.
Peckstow 30"x18 ga. Squaring Shear
Niagara Ring & Circle Shear

MILLING MACHINES

#3, #4, #5 Cinn. High Power, Plain, S.P.D.
P & W 2½" Duplex Spline Miller, M.D.
Hanson & Whitney 10"x24" Thread Miller
Pratt & Whitney 6"x24" Thread Miller
#3B Hendey Universal Miller, motor drive
#4 Cinn. Vertical High Power Miller. (2)
Milwaukee #2 Dble. Overarm. Motor driven.
Cincinnati #3 Dial Type Vertical. M. Drive.

BORING MILL

3½" Bar Landis-Rochester Horizontal Boring Mill, Model #3

RADIAL DRILLS

3½' Arm, 10" Column Cincinnati-Bickford
4' Arm, 11" Column Cincinnati-Bickford
5' Arm, 13" Column Cincinnati-Bickford
5' Arm, 14" Column Fosdick, motor drive
6' Arm, 15" Column Cincinnati-Bickford

SHAPERS — PLANERS

Fellows No. 6—36" Gear Shaper, motor dr.
24" American H.D., B.G. Crank Shaper. Motor drive 3/60/220/440
20x20x36 N.B.P. Shaper Planer
Whitcombe 24"x24"x6' Planer
1—New Haven, 12" Slotter (like new)
Gray 26"x26"x8' Planer
Betts 120" x 72" x 35' Metal working Double Housing Planer. Equipped with: 4 heads and power rapid traverse. With motor drive and controls, bed is 61' 3½" long

Pratt & Whitney 0" to 6" Vertical Shaper, swivel head on ram, rotary table—20" diam. Recently overhauled. Very good condition. Motor driven.

POWER PRESSES

2—#1A Standard Bench Type Press, ¾" stroke
#4 Bliss D. C. Forging Press
Bliss 68-C Double Action, three Crank Press.
Hilles & Jones #4 Single End Punch and Shear. Equipped as Plate Shear with 18" Blades. AAR, motor drive, 48" throat
Bliss #76½B Single Crank Geared Press, 7" shaft, 3" stroke
Horton-Ackerly, Back Flywheel Bench Presses, ¾" & 1" stroke
Caldwell, 200 tons capacity, Hydraulic Horizontal Wheel Press
Lucas 15 ton Power Arbor Press
Bliss-Consolidated #163B S.S. Dble. Crank Press
Baxendale #4 O.B.I. Power Press, 2½" stroke
Clearing, Crankless Press #F-1200-28, 200 tons cap. Motor drive.

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Telephone
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MACHINERY COMPANY
Machinery Merchants

18 WARD ST.
ROCHESTER 5
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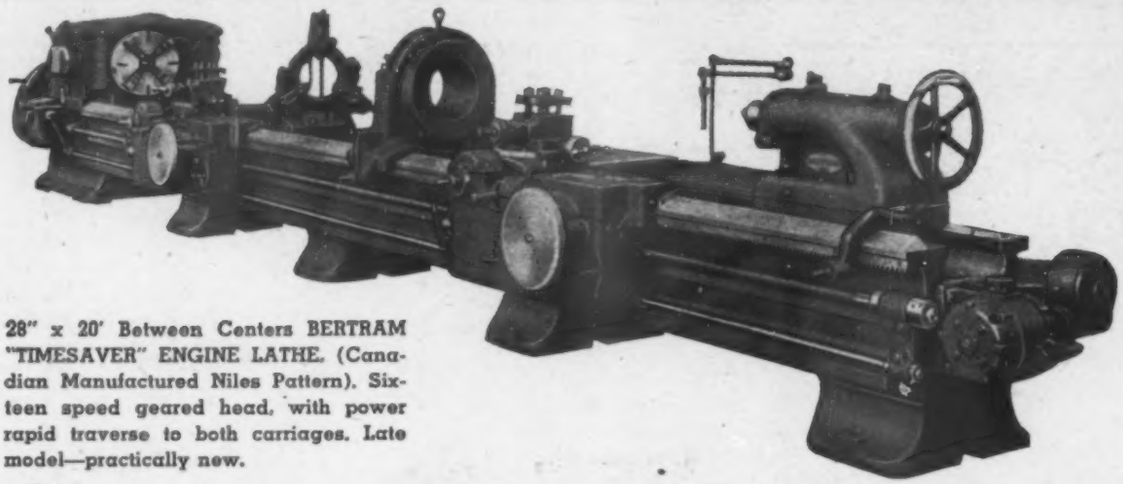
QUALITY *Machine Tools* NOW IN STOCK



28" x 20' Between Centers BERTRAM "TIMESAVER" ENGINE LATHE. (Canadian Manufactured Niles Pattern). Sixteen speed geared head, with power rapid traverse to both carriages. Late model—practically new.

Three No. 36 Hanchett Rotary Surface Grinders, 40" chuck, 40 HP motor. Latest model.

Ten No. 18 Blanchard Rotary Surface Grinders with 36" and 30" chucks, 25 HP motors. Latest types.

16" x 216" Landis Plain Hydraulic Grinder, with power cross feed, swivel type table, "dead" work spindle with DC motor on work headstock and AC motor for wheel spindle. New in 1941.

AUTOMATICS

9/16" RA-6 Acme-Gridley. New in 1943.
1⅝"—8 spindle Conomatic. New in 1942.
2⅝" RA-6 Acme-Gridley. New in 1943.
5½" Cleveland Model A, single spindle.
16" x 33" Fay Automatic Lathe.

BORING MILLS

No. 41 Lucas. New in 1941.

DRILLS

★ **28" Cincinnati-Bickford Super Service Drill, box column type, with flanged quill unit, motor driven. Latest model.**
4' Canedy-Otto Radial Drill. New 1946.
No. D2 Colburn, single spindle.
No. 314 Baker, single spindle.
42" Cincinnati-Bickford.
★ **No. 3B-12 Edlund, four spindle, with back gear and semi-automatic power feed, m.d. New in 1944.**
★ **No. 2LM8 Leland Gifford Single spindle drill, with hand-hydraulic spindle feed, motor driven. New in 1943.**
★ **No. 3 Baush Multiple Drill, 20 spindle, No. 2 Morse Taper, rectangular head 20" x 40".**

GEAR CUTTERS

24H Gould & Eberhardt Universal Gear Hobber. New in 1942.
No. 3 and No. 12 Barber-Colman Gear Hobbers.
No. 61 Fellows Gear-Shaper, m.d.
No. 7125 and No. 715 Fellows Gear Shaper, m.d.
6" Gleason Straight Bevel Gear Generator.
★ **No. 3616 Cleveland Rigidhobber, spur or spiral gears to 42" diameter x 16" face, m.d. New in 1943.**

GRINDERS

No. 22 Heald Rotary Surface Grinder.
No. 18 Blanchard Surface Grinder. New in 1944.
No. 72A3 Heald Sizematic Internal Grinder.
6 x 18 Cincinnati Cylindrical. New 1943.
10 x 36 Landis Plain Hydraulic Cylindrical Grinder. New in 1943.
14" x 48" Cincinnati Plain Self contained Grinder, Filmatic-bearings.
16" x 216" Landis Plain Hydraulic Grinder Type B.
No. 13 Brown & Sharpe Universal and Tool.
★ **No. 2 Cincinnati Centerless Grinders, with Filmatic spindle, some with through feed rest, others with infeed, motor driven. New in 1940 and 1941.**
★ **Model B Thompson Hydraulic Surface Grinder, 10" x 24" capacity. New in 1942.**
14" x 60" Mattison Surface Grinder, Hydraulic. Late model.

LATHES, ENGINE

10" x 20" Monarch EE Toolmakers Lathe. Latest model.
12" x 30" Pratt & Whitney, g.h.
14" x 6' Sebastian, motor in base.
16" x 6' Hendey, g.h.
20" x 48" Lodge & Shipley, Timken Spindle. New in 1943.
24" x 12' Monarch helical. g.h.
★ **28" x 28' Bertram "Timesaver", (Canadian Manufactured Niles Pattern) actual swing 29" distance between centers 20', with rapid traverse to carriage. Motor driven. Latest model.**
48" x 12' Lodge & Shipley, c.d.
IMP and LR LO-Swing Lathe, m.d., New in 1940.
15" x 30" Lipe Carbo-matic. New 1943.
17" x 50" LeBlond Production, m.d. New in 1942.

LATHES, TURRET

★ **No. 3L Gisholt, cross sliding turret, taper attachment. New in 1943.**
No. 3A Warner & Swasey.
No. 1A Warner & Swasey. New in 1943.
No. 4 Gisholt, Universal. New in 1943.
No. 5 Warner & Swasey Universal. New in 1942.
No. 3 Warner & Swasey. New in 1943.
No. 1 Bardons & Oliver, c.d.
No. 1 Brown & Sharpe, m.d.
42" Bullard VTL, New Era.

MILLS

No. 9J Gorton, with tracer.
No. 3 Cincinnati Universal, motor in base, rectangular overarm.
No. 5 Cincinnati Plain High Power Model HO.
No. 4 K & T Milwaukee Plain. New in 1942.
No. 2MH Cincinnati Plain m.d.
★ **28" x 60" Cincinnati Vertical Hydrotel, single spindle, with profile tracing attachment, motor driven.**
No. 4 Cincinnati Vertical, high speed dial type, latest model.
No. 2H Milwaukee Vertical, motor in base.
No. 2209 Milwaukee Mill, table 22" x 158".
No. 3-36" Cincinnati Hydromatic Duplex, m.d.
No. 6 Whitney Hand Mill.
Nichols Hand Mill, coolant equipment. New in 1943.

MISCELLANEOUS

Sheffield Visual Gauge Model 1000.
Relieving attachment and 6 to 1 Subheadstock for Monarch 12" x 16" lathe. New and unused.
No. 7488 Walker Magnetic chuck, 7" x 48" swivel type, new and unused.

PLANERS AND SHAPERS

16" Gould & Eberhardt Crank Shaper, m.d.
20" American Crank Shaper, m.d.
24" American Crank Shaper, m.d.
6" Pratt & Whitney Vertical Shaper.
No. 14 Cochrane & Bly Vertical Shaper.
42" x 42" x 20' Cincinnati Planer, D.C., Rev. M.D.

ALL MACHINES MAY BE INSPECTED UNDER POWER IN OUR WAREHOUSE

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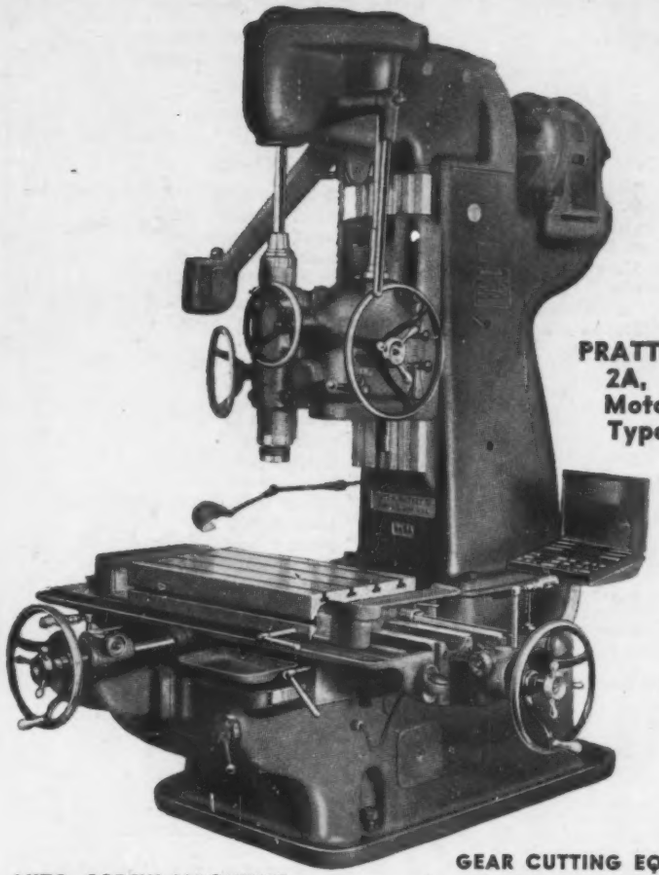
1961 S. Meridian St., Indianapolis 6, Indiana
EASTERN BRANCH: 44 WHITEHALL ST., NEW YORK
MEXICO OFFICE: HIDALGO ORIENTE 2-535-B, MEXICO, D.F.

LATEST TYPE NEARLY NEW MACHINES



PRATT & WHITNEY 2A, 3B Jig Borer, Motor Drive, Latest Type

AUTO. SCREW MACHINES

ACME GRIDLEY 2" Model RA 6-spindle
BROWN & SHARPE #4 High Speed, 1⅛"
CONOMATICS 3½"—4 spindle—latest type
CONOMATIC 2⅝"—6 spindle—latest type

BORING MILLS—Horizontal

DEFIANCE 25A—3¾" bar—Latest Type
DETRICK & HARVEY 4", 5" bar, Floor Type
EXCELLO—Style 2112A—Jr., Latest Type
GIDDINGS & LEWIS 25RT—2½" bar, Latest Type
LANDIS #35, 3⅛" bar, Floor Type
NILES BEMENT POND 4½" Bar, Motor Drive
NILES BEMENT POND 5", 6", 7" bar, floor
OHIO 5T-600—5" bar, Latest Type
UNIVERSAL #3A—3" Bar, Motor Drive

BORING MILLS—Vertical

BETTS 120", 2 swivel heads, AC, M.D.
BETTS (Consolidated) 84"—3 heads, AC, Latest
BETTS (Consolidated) 100"—2 heads, DC, Latest
BULLARD 16" Spindle Type D—Mult-au-matic, Latest
NILES 62", 73", 100", 120"—2 swivel heads, P.R.T., M.D.
SELLERS—20'—2 swivel heads, A.C., M.D.
BULLARD 36" N E Type
KING 36" Vertical Turret, M.D., Latest Type

BROACHES

LA POINTE #3L—15 ton, 52" stroke, Latest
LA POINTE #4L—35 ton, 68" stroke, Latest
LA POINTE—Vertical Surface, 25 ton, 66" stroke, Latest
LA POINTE—Vertical Surface—10 ton—54" stroke—Latest

DRILLS—Radial

AMERICAN 3'11" Hole Wizard—Latest
CARLTON 6'15", Ball Bearing—M.D.
CARLTON 8'19" Ball Bearing—Latest
WESTERN 5'18"; 6'20"—Latest

GEAR CUTTING EQUIPMENT

BROWN & SHARPE No. 3H gear cutter, M.D.
FELLOWS 64 #615A, 645A3, #7, 7A, 72, 75A, 77 High Speed Gear Shapers, latest type
GOULD & EBERHARDT #36H, 96H, with diff.
PRATT & WHITNEY 10" Grinder, hyd., latest

GRINDERS—Cyl.—Plain & Univ.

BROWN & SHARPE #1, 3, 4, Uni. Latest
LANDIS 6x18 Type "C", Fyd., Latest Type
LANDIS 30x220" Centers, Plain, Motor Drive
NORTON 16x72" Plain Type "C", latest type
NORTON 16x72" Univ., Hyd., Type C, latest
NORTON 14x36" Univ., Hyd., Type C, latest

GRINDERS—Misc.

CINCINNATI #2, 4 Centerless, Latest
BARBER COLMAN #3 Hob Sharpener, Latest
HEALD—75A, 72A-3, 72-A5, 81—Internal, Latest

GRINDERS—Surface

ARTER 30" Rotary Surface—Hyd. latest type
BLANCHARD No. 16A—Dial Type—M.D.
BLANCHARD #27-18 M.D., Latest Type
DOALL #G10, 8x24", Hyd., latest type
GALLMEYER & LIVINGSTON #35, 8x24" Hyd.
GALLMEYER & LIVINGSTON #55, 10x36" Hyd.
MATTISON 12x16x48 Hyd., Latest Type
MATTISON 14x16x60 Hyd., Latest Type
NORTON 10x36 Hyd., Latest Type
THOMPSON 16x30x48 Hyd., Latest Type
THOMPSON 8x12x24 Hyd., latest type

LATHES—Engine and Mfg.

BETTS BRIDGEFORD 60"x24' bed (raised to 84")
BRIDGEFORD 36"x28', 36"x32' bed—M.D.
LEBLOND 13"x4', 17"x5', 17"x14' bed, Rapid Production, Timken Bearing, latest type
LODGE & SHIPLEY 16/20"x30" centers, Timken Bearing, latest type
LOSWING 4x60, 4x84, 8x60, 8x108, 5x34" centers Timken Bearing, latest type
NILES—42x60", double head, motor drive
NILES 48x23', 32', 34', 35' Centers, Heavy Duty, 1 or 2 carriages, Timken Bearing, PRT, Latest Type
NILES 60"x10', 35', 40', Centers, Heavy Duty, Timken Bearing, 1 or 2 carriages, Latest Type
NILES 30x50' Boring, Timken, Latest Type
PITTSBURGH 50'x30' bed—M.D.
REED PRENTICE 20"x54" Centers, Timken, Latest
REED PRENTICE 24x20' bed, AC, M.D.
SPRINGFIELD 16x54" centers, Timken Bearing, latest
WARD HAGGAS & SMITH 18/36"x10' bed, Gap.

LATHES—Turret

CINCINNATI ACME, No. 1, No. 5W, Timken, latest
GISHOLT #3, 4, 5, Univ., Timken, Latest
GISHOLT No. 4L 9" hole—cross sliding turret—Timken Bearing—latest type
GISHOLT #1L, #2L, Universal, Timken, Latest
JONES & LAMSON #3, 7C, 8A, Univ., Timken
LIBBY No. 1H-5 Timken Bearing—latest—5⅛" hole
MOREY No. 2G, No. 3, No. 4, Timken Bearing, latest
WARNER & SWASEY 3, 4, 5, Universal, Timken Bearing, Latest Type
WARNER & SWASEY #1A, 4A Univ., Timken Bearing, latest type
WARNER & SWASEY #3A, Univ., 6" hole, Bar or Chucking, Timken Bearing, latest type

MILLING MACHINES—Mfg.

CINCINNATI 3-24 Duplex, Hydromatic, Latest Type
INGERSOLL 32x24x16' Planer Type, 2 heads, AC
INGERSOLL 48x42x16' Planer Type, 4 heads, AC

MILLING MACHINES—Plain

BROWN & SHARPE #12, Timken, Latest
CINCINNATI—4-36, 2-24, Timken, Latest
CINCINNATI #4, 4S, 5 Timken Bearing, M.D.
CINCINNATI #2, #3, Dial Type, Timken, Latest
KEARNEY & TRECKER, 1218, Simplex, Timken, Latest
KEARNEY & TRECKER #2H, 3K, 4K, Timken Bearing, latest type
KEMPSMITH #4 Maximill, Timken Bearing, latest

MILLING MACHINES—Universal

AMES Bench, Timken, Latest
HARDINGE, Model UM, Timken, Latest
VAN NORMAN—12, 22L, Timken, Latest

MILLING MACHINES—Vertical

CINCINNATI—2, 3, 4, Dial Type, Timken, Latest
CINCINNATI No. 3, No. 4 High-Powered, M.D.
KEARNEY & TRECKER 2K, 3K, Timken
REED PRENTICE #3VG, with or without Detroit Hyd. Univ. Duplicator, Timken Bearing, latest type

PLANERS

CHANDLER 36x36x20', 4 heads, AC, M.D.
DETRICK & HARVEY 48x48x16', 4 heads, Hyd.
DETRICK & HARVEY 84"x84"x18'—4 heads, DC, M.D.
GRAY 36"x36"x16'—3 heads, DC, M.D.
LIBERTY 24"x24"x8'—2 heads, VARI-VOLTAGE—AC, Latest
ROCKFORD 24"x24"x66"—3 heads, Hyd., Latest
NILES BEMENT POND 48x48x16', 2 heads, AC
OHIO 42x42x20'—2 heads, AC, M.D.

SHAPERS

GOULD & EBERHARDT 24" High Duty, M.D.
LAMAIRE 18' Vert. Hdraulic—latest type
MOREY 8", 10", 12", 14" Vertical, latest type
MORTON—48"—Draweut, M.D.
ROCKFORD—36"—Openside—Hyd., Latest
SMITH & MILLS 25" Heavy Duty, latest type

MISCELLANEOUS

PRATT & WHITNEY KELLER Type G, Type BL 2416—Latest Type
PRATT & WHITNEY—2A, 3B Jig Borer, Latest Type
LANDIS—1"—Bolt Threader—Latest Type
BARNES 172, 249 Vertical Hone—Latest
CLEARING—K-1200-30—Knuckle Joint Coining Press—200 ton—Latest
FERRACUTE DG-55-75 ton—Drawing Press—Tie Rod—17" stroke—Latest
Do-ALL—ML 16V36 Saw—Latest

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LATHES

12"x21" Fay Automatic (1942)
12"x18" Lipe Carbo, Motor Drive
18"x6' American Grd. Hd.
20"x10' Lodge & Shipley
22"x48" Centers Monarch (1942)
36"x30' Lodge & Shipley Triple Geared Selective Head, two carriages
42"x18' Putnam Geared Head
50"x17'cc LeBlond Geared Head

MILLING MACHINES

No. 2K Milwaukee Plain (1941)
No. 4 Cincinnati High Power Plain
No. 2H Milwaukee Vert. (1942)
No. 2 Cincinnati Vert. (1942)
No. 2M Cincinnati Vert. (1941)
No. 3 Standard Milwaukee Vert.
No. 3 Cincinnati Vert. Dial Type
No. 3 Cincinnati Vert. High Power
No. 3K Milwaukee Vertical
24" Cincinnati Production
No. 46-90 Cincinnati Plain Hydromatic
No. 27-MB Smalley-General Thread
No. 2 Hanson-Whitney Thread
4" Taylor & Fenn Spline, M.D.
24"x24"x12' Ingersoll Adj. Rail
26"x25"x12' Ingersoll Adjustable Rail
54"x36"x10' Ingersoll Adjustable Rail
60"x48"x12' Ingersoll Adjustable Rail

DRILLS

No. 121 Baker, Motor Drive
28" Cinn.-Bickford
No. D-8 Colburn No. 6 M. T.
No. 2 LMS—26"—1 Spdl. L-G (1944)
No. 2 LMS—20"—2 Spdl. L-G (1944)
No. 2 LMS—26"—2 Spdl. L-G (1945)
No. 2 LMS—20"—3 Spdl. L-G (1943)
No. 2 LMS—14"—4 Spdl. L-G
No. 4 BM—24"—4 Spdl. Fosdick
No. 2 LMS—26"—4 Spdl. L-G
No. 2LMS—26"—6 Spdl. L-G
No. 2—8 Spdl. Leland-Gifford
6'-15" Col. Cinn.-Bickford
7'-15" Col. American Full Universal
7'-15" Col. Carlton, Motor on Arm

VERT. BOR. MILLS

34" King
42" Bullard New Era
72" Cincinnati
72" Niles Extra Heavy

HOR. BOR. MILLS

No. 25C, 3¾" Bar Defiance, Table Type (1942)
No. 360-F Giddings & Lewis (1942)
No. 560-F Giddings & Lewis (1942)

GEAR MACHINES

No. 7 Fellows Gear Shaper
11" Gleason Bevel Gear Cutter

PLANERS

36"x36"x12' Cincinnati, 4 Heads
42"x36"x12' Cincinnati, 3 Heads

MISCELLANEOUS

2500 Ton Lake Erie Hydraulic Press
No. 4 Mitts & Merrill Keyseater (1942)

TURRET LATHES

No. 2 B. & S. Screw Machine, Wire Feed
No. 3 Jones & Lamson (1942)
No. 3 Warner & Swasey, bar feed (1940)
No. 5 Warner & Swasey bar feed (1941)
2-A Warner & Swasey (1943)
No. 3-A Warner & Swasey, 6" capacity bar feed
18" Libby, 3½" H.S.
No. 3L Gisholt, Cross Turret, bar feed

GRINDERS

No. 5 B. & S. Plain (3" x 18")
4"x18" Landis Plain
10"x72" Colonial Broach Grd.
10"x24" Landis Universal
12"x36" Landis Univ. Type LCH (1945)
12"x48" Cincinnati Univ.
16"x72" Norton Type C Plain
No. 22—12" Heald Rotary Surface
No. 5 Abrasive Surface Grdr.
No. 34 Abrasive Surface Grdr.
Norton Motor Driven Grinders, sizes 6x18 to 24x240

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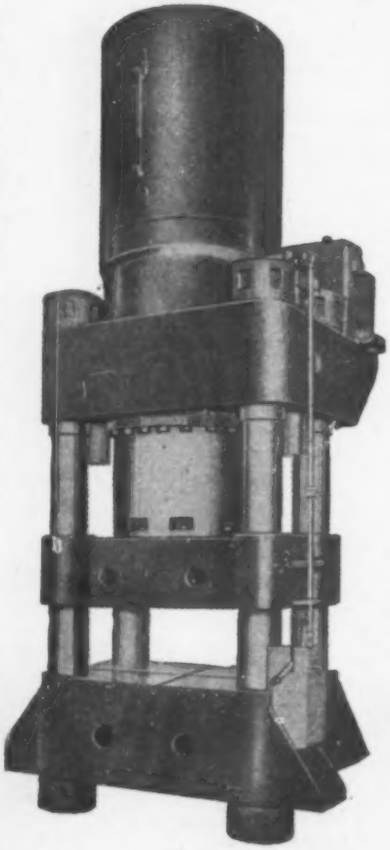

1300 TON WATSON STILLMAN HYDRAULIC PRESS

Self Contained

Platen size 48"x42". Stroke 22". Opening 37. Ram Diameter 35". Driven by 50 H.P. Motor, *Also*

600 TON ELMES PRESS

Self contained 48x45" between rods, 36" stroke, 66" openings, 75 H.P. motor, 3 phase, 60 cycle, 220v.

1320 TON PRESS, SELF CONTAINED

600 Ton Self Contained Lake Erie Double Action Press with 175 Ton Cushion Cylinder. Distance between rods 48"x60", Stroke 30", opening 48".

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PUNCH PRESSES

IMMEDIATE DELIVERY FROM STOCK

Brand new inclinables, immediate delivery, 40, 50, 70, and 136 ton. Walsh, Niagara, Federal.

#4½ Bliss, 80-100 ton rated cap 21x27 bed, 4½" stroke, with all accessories, latest design, 30, 88, 110 strokes per min.

#6 Bliss, 90-125 ton rated cap. 25x30 bed, avail. in 4½" and 5½" stroke, with all accessories, latest design, 30, 88, 110 strokes per min.

35 and 40 ton rated cap. Toledo Horning Presses, 2", 4½" stroke.

#3 Niagara, 20 ton rated cap. $375.00 ea.

Brand new 4½ ton OBI Presses, reduced to $165.00 ea. New 15 ton reduced to $363.00 ea.

1—#87 Bliss Press, 175 ton rated cap. 32" stroke, late model.

BUTT & SPOT WELDERS, IMMEDIATE DELIVERY 5-300 KVA, BRAND NEW.

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2—No. 0G B & S High Speed Automatics with slotters
1—No. 2G B & S High Speed Automatic with slotter

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D. E. DONY MACHINERY CO.
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THE LARGEST MACHINE TOOL PLANT IN THE U.S.A.

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DEVOTED EXCLUSIVELY TO REBUILT MACHINERY

ENGINE LATHES

12"x36" centers Lodge & Shipley Selec. Head, m.d. in base, taper
12"x84" centers Lodge & Shipley Selec. Head, m.d. in base, taper
13"x30" centers Pratt & Whitney Model B, m.d. in base, taper
13"x48" Pratt & Whitney, as above
14"x6' American Geared Head, m.d., taper
14"x6' Hendey Geared Head, m.d., taper
14"x6' Hendey Geared Head, m.d., taper
14"x6' Sidney Geared Head, m.d.
14"x6' Springfield Geared Head, m.d., taper
16"x6' Bradford, cone
16"x6' Hendey Geared Head, m.d.
16"x6' Lodge & Shipley Selec. Head, m.d.
16"x30" centers Monarch Geared Head, m.d. in base
17"x8' LeBlond, cone
18"x48" centers Monarch, m.d. in base, latest
18"x7' Hendey Geared Head, m.d., taper
18"x8' American Geared Head, m.d., taper
18"x8' Champion, cone
18"x8' Greaves-Klusman, cone, taper
18"x8' Hendey Geared Head, m.d., taper
18"x8' Lodge & Shipley, cone
18"x8' Whitcomb-Blaisdell Geared Head
19"x10' LeBlond Geared Head, m.d.
20"x48" American Pacemaker, m.d., latest
20"x48" Monarch, m.d., in base
20"x48" Reed-Prentice, m.d.
20"x72" centers Monarch Geared Head, m.d. in base
20"x12' Lodge & Shipley Selec. Head, m.d.
21"x12' LeBlond, cone, taper
21"x18' LeBlond, cone
22"x70" Greaves-Klusman Geared Head, m.d., taper
23"x12' LeBlond Geared Head, m.d., taper
24"x10' American, cone, taper
24"x10' American, medium pattern, cone
24"x10' Greaves-Klusman Geared Head, m.d.
24"x10' Hendey Geared Head, m.d.
24"x10' Lodge & Shipley, cone
24"x12' LeBlond, cone
24"x12' Reed-Prentice Geared Head, taper
24"x14' Boye & Emmes, cone
24"x20' Lodge & Shipley, cone, taper
25"x10' LeBlond, cone
26"x16' Boye & Emmes, m.d.
26"x23' Niles, m.d.
27"x18' LeBlond, m.d.
30"x26' Lodge & Shipley Selec. Head, m.d.
36"x12' Lehmann, m.d., latest hydratrol type, taper
36"x18' Lodge & Shipley Selec. Head, m.d.
36"x28'6" Niles H.D., m.d., latest
36"x30' Lodge & Shipley Selec. Head, m.d.
36"x32' center Putnam Geared Head, m.d.
50"x204" centers LeBlond Geared Head, m.d., taper, latest

TURRET LATHES

No. 1 Cincinnati Acme Semi-Universal, bar, Timken equipped, late
No. 1 Cincinnati Acme Semi-Universal, chucking
No. 1L Gisholt, m.d., Timken, air chuck, late
No. 1L Gisholt as above, long bed type
No. 1A Warner & Swasey, pre-selector head, air chuck, latest
No. 1A Warner & Swasey, chucking
No. 1A Warner & Swasey, bar
No. 2 Cincinnati Acme Full Universal, chucking, latest
No. 2L Gisholt, air chuck, Timken, late
No. 2L Gisholt, as above, long bed type
No 2 Pratt & Whitney Shaver, m.d.
No. 2 Warner & Swasey All Geared Head, bar, latest
No. 2A Warner & Swasey, bar
No. 2A Warner & Swasey, chucking
No. 2A Warner & Swasey, bar, preselector head, latest
No. 2A Warner & Swasey, chucking, preselector head, latest
No. 2A Warner & Swasey, chucking, Timken equipped
No. 2B Foster Universal, chucking
No. 2G Morey Ram Type, bar
No. 3S Cincinnati Acme Fixed Center Universal, Chucking, latest
No. 3 Cincinnati Acme, older type, chucking
No. 3 Foster Geared Head, bar
No. 3B Foster Universal, bar
No. 3L Gisholt, chucking, Timken
No. 3 Warner & Swasey Universal, ram type, chuck, latest
No. 3 Warner & Swasey Universal, ram type, bar, latest
No. 3A Warner & Swasey, chucking, 6" hole, latest type
No. 3A Warner & Swasey, bar, older type
No. 3A Warner & Swasey, chucking
No. 4 Gisholt Universal, chuck, Timken
No. 4 Warner & Swasey Plain, cone
No. 4 Warner & Swasey Geared Head, bar and chucking types
No. 4 Warner & Swasey Universal, preselector head, bar, latest
No. 4 Warner & Swasey Universal as above, chucking
No. 4A Warner & Swasey Universal, chucking, 8" hole, latest
No. 4A Warner & Swasey Universal, chucking, 7½" hole, Timken
No. 4R Cincinnati Acme, bar
No. 5 Foster All Geared Universal, chuck
No. 5 Jones & Lamson Universal Ram Type, chucking, latest
No. 5 Warner & Swasey Universal, preselector head, bar and chucking types, latest
No. 7 Bardons & Oliver Universal Ram Type, chucking, late
2½" Jones & Lamson Universal Saddle Type, bar, latest
2½x24", 3x36", 3½x32", 4x34" Jones & Lamson Geared Head, bar and chucking types
2 spindle 3x36" Jones & Lamson, chucking
18" and 26" Libby Geared Head, chucking
24" and 28" Gisholt, cone

PLAIN MILLING MACHINES

No 000 Brown & Sharpe, m.d., latest
No. 1A Milwaukee, m.d.
No. 1M Cincinnati, m.d.
No. 1½, 2 Cincinnati, cone
No. 2 Cincinnati High Speed Dial Type, m.d., latest (3)
No. 2L Cincinnati, m.d., latest (4)
No. 2MH Cincinnati, m.d., latest
No. 2HL Milwaukee, m.d., latest
No. 2B Brown & Sharpe, m.d., latest
No. 3B Brown & Sharpe, m.d., latest
No. 3K Milwaukee, m.d., latest
No. 3S Cincinnati, m.d.
No. 3 Oesterlein, cone
No. 4B Brown & Sharpe, m.d.
No. 4 Cincinnati H.S. Dial Type, m.d , latest (3)
No. 4 Cincinnati H.P., m.d.
No. 5B Heavy Brown & Sharpe, m.d.
No. 5 Cincinnati High Power, rect. overarm, Timken (7)
No. 5 H.D. LeBlond, s.p.d.

VERTICAL MILLING MACHINES

Bridgeport Universal Vertical, latest
Cincinnati Hydromatic, 2 vertical spindles on rail
No. 2, 3, 4 Cincinnati High Speed Dial, m.d. in base, latest
No. 2, 3, 4 Cincinnati High Power, m.d.
No. 2M Cincinnati, m.d.
No. 2H, 4H Milwaukee Dial Type, m.d., latest
No. 2K, 3K, 4K Milwaukee Dial Tlue, m.d., latest
No. 2½B, 3B Milwaukee, m.d.
No. 3 Cincinnati Medium Speed Dial, m.d., latest
No. 3V Toledo, s.p.d.
No. 3V Van Norman, m.d., latest
No. 4 Milwaukee, m.d., in base
No. 5 Brown & Sharpe, cone
No. 5 Jackson, m.d.
No. 5 Reed-Prentice, m.d., circular attachment, latest
No. 6 Becker, cone
No. 36V Van Norman, m.d., latest
No. 28-60 Cincinnati 2 spindle Hydro-Tel, m.d., latest

SHEET METAL MACHINERY

Southwark Rotary Metal Cutter, 36" throat, 3/8" cap., m.d.
No. 100—120" Niagara Heavy Production Folder, m.d.
No. 2 Campbell Nibbler, m.d.

MANUFACTURING LATHES

No. 9 H.D. LeBlond MultiCut, m.d.
3½x36", 3½x80", 8x84" Lo Swing
4x60", 8x84", 8x132" LoSwing, hardened ways, latest
9x12" Sundstrand
13x24" Coulter Automatic, m.d.
13x96" Automatic Threading
16"x6' Cincinnati Mfg. m.d.
16"x6' LeBlond Rapid Production
17"x6' LeBlond Auto. Mfg.
20"x9' American Geared Head Mfg.
21"x8' LeBlond Turret, cone
No. 4 R. K. LeBlond Boring, 14'4" boring length
Niles-Bement-Pond Quartering Machine, m.d.

MANUFACTURING MILLING MACHINES

No. 00 Sundstrand Hydraulic Rigidmill, m.d., latest
No. 08 Cincinnati EA Plain Auto., m.d., new Type P Ohio Mfg., m.d.
No. 1-12 Cincinnati Plain Automatic, m.d., latest
No. 1-18 Cincinnati Plain Automatic, m.d., latest
No. 2-24 Cincinnati Plain Automatic, m.d., latest
No. 2-24 Cincinnati with ring and full attach., latest
No. 3A Sundstrand Copy Rigidmill, m.d.
No. 3-24 Cincinnati Plain Hydromatic, m.d., latest
No. 3-36 Cincinnati Duplex Hydromatic, m.d.
No. 34-36 Cincinnati Duplex Hydromatic, m.d., latest
No. 4-48 Cincinnati Plain Hydromatic, m.d., latest
18", 24" Cincinnati Plain Automatic, m.d.
24", 48" Cincinnati Duplex Automatic, m.d.
No. CT-36, CT-54 Lees-Bradner Thread, m.d.
Hall Planetary Thread, m.d.
4" Pratt & Whitney Spline
6x14", 4½x12", 6x48", 6x80" Pratt & Whitney Thread
10x24" Hansen-Whitney Thread, m.d.
24"x6' Ingersoll Slab, m.d.
30"x30"x12' Ingersoll Slab, 2 heads, m.d.
36"x24"x8' Ingersoll, 1 rail, 2 side heads

UNIVERSAL MILLING MACHINES

No. 2 H.D. LeBlond, cone
No. 3 Cincinnati, m.d.
No. 4 LeBlond, m.d.
No. 4 Brown & Sharpe, m.d.

PLANERS

30"x30"x14' Gray, 2 heads, belt
32"x32"x16' Gray, 2 heads, belt
36"x36"x10' Niles, 2 heads, belt
36"x36"x12' Cincinnati, 4 heads, reversing, m.d.
36"x36"x18' Niles-Bement-Pond; 2 heads, reversing m.d.
36"x36"x20' Cincinnati, 2 heads, belt
38"x38"x20' Gray, 2 heads, belt
38"x38"x20' Gray, 2 heads, belt
42"x42"x26' Gray, 2 heads, belted m.d.
48"x48"x12' Gray, 4 heads, reversing m.d., p.r.t., box table
48"x48"x18' Detrick & Harvey, 4 heads, reversing m.d.
48"x48"x28' Cincinnati, 4 heads, reversing m.d.
48"x48"x30' Cincinnati, 4 heads, m.d.
48"x48"x32' Niles-Bement-Pond, 4 heads, reversing m.d., box table
48"x48"x40' Sellers, 2 heads, reversing m.d.
62"x62"x40' Cincinnati, 4 heads, reversing m.d.
66"x60"x40' Niles-Bement-Pond, 4 heads, reversing m.d.
72"x72"x24' Niles-Bement-Pond, 4 heads, reversing m.d.
72"x72"x36' Niles, 4 heads, reversing m.d.
96"x72"x18' Pond, 4 heads, belted m.d.
P10 Coulter Crank Type, m.d.

SLOTTERS

10" Newton, cone
12" Bement-Niles, m.d.
15" Canada, m.d.
48" Niles-Bement-Pond Geared, reversing m.d.

MISCELLANEOUS

Pratt & Whitney BL-2420 Keller Machine, latest
Gisholt Precision Balancing, m.d.
40" American Machine & Metals Chip Wringer, m.d.
No. 12M Morey 2 spindle Profiler, m.d.
Detrick & Harvey 2 spindle Profiler, belt
No. 12 Pratt & Whitney 2 spindle Profiler, belt
No. 11, 11S Cochran-Bly Saw Sharpeners
Wagner Saw Sharpener, m.d.

LET US QUOTE ON YOUR REQUIREMENTS.
MORE THAN 2,000 MACHINES IN STOCK

THE EASTERN MACHINERY COMPANY
1004 Tennessee Avenue, Cincinnati 29, Ohio
MElrose 1241
CABLE ADDRESS EMCO

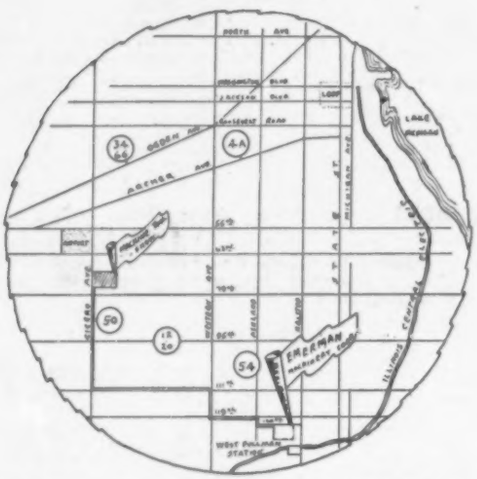
NO TICKET REQUIRED

VISIT OUR WAREHOUSE

INSPECT OUR STOCK

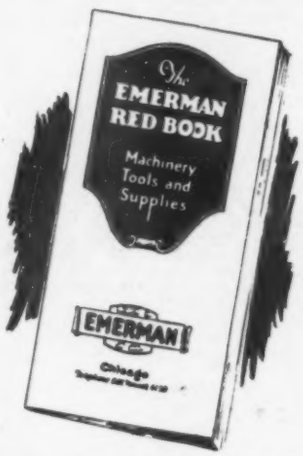
EMERMAN MACHINERY CORPORATION
Chicago, Ill.

BY CAR



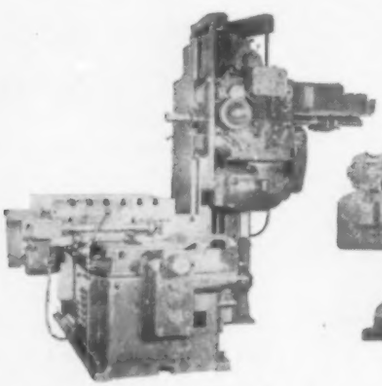
Drive South on Cicero Avenue, to West 111th Street. Turn East to Western Avenue. Then South to 119th Street. East on 119th St. to Ashland Avenue. Turn South one block to 120th Street then east to 875 West 120th St. or I.C. train direct from the Loop to West Pullman Station. Plant is next to station.

BY MAIL

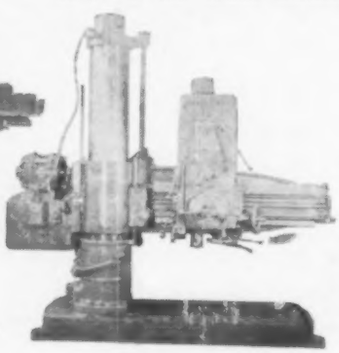


CHECK NOW TO MAKE SURE YOUR NAME IS ON OUR LIST FOR THE NEXT ISSUE OF THE EMERMAN RED BOOK.

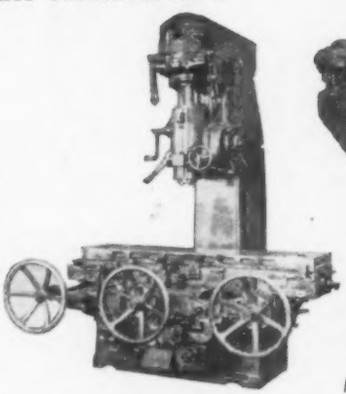
A FEW OF OUR CURRENT ATTRACTIONS



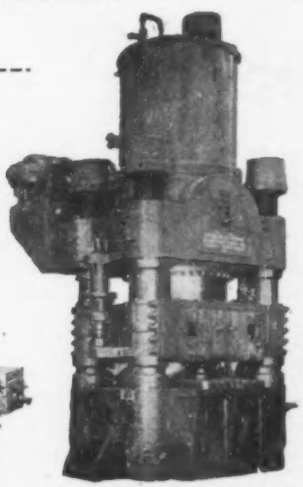
No. 3A DE VLEIG Jig Mill



4' Fosdick "Economax" Radial Drill



No. 5 Reed-Prentice Vertical Jig Milling Machine, table 68"x16", motor drive

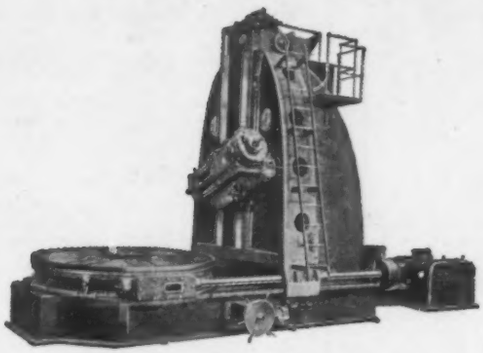


H.P.M. 2000 ton fast traverse, HYDRAULIC PRESS. Bed 45½"x67½". Stroke 12". Shut height 20¾" with pumps, motor, and controls.

EMERMAN MACHINERY CORP.

875 W. 120TH STREET — CHICAGO 43, ILLINOIS

SIMMONS has the GEAR HOBBERS



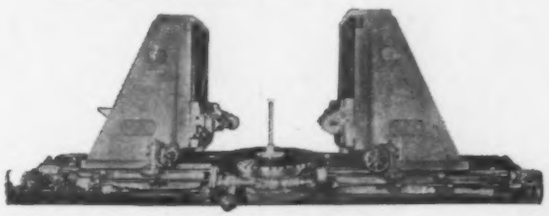
(see above) 100/126" Muir Vertical Traveling Head Hobber for helical, worm and spur gears. Enclosed gear box. Power rapid traverse. Capacity 100". Dia. at 30 degree spiral angle.

30" cap. Biernatzki, for single helical, worm and spur gears.

40" x 13' No. P.D.U.—3 Power Plant Ltd. Double Headed Pinion Hobber for double helical, spur or worm gears. Will cut RH and LH helicals simultaneously.

100" Gould & Eberhardt Horizontal Gear Hobber for helical, worm and spur gears, rated capacity 100" x 48" face.

(see below) 18' Power Plant Ltd. Double Headed Universal Gear Hobber for helical, herringbone, worm and spur gears. Automatic oiling. Differential mechanism. Enclosed gears. Table dia. 11'-4". Approximate floor space 60' x 15'.



Write today for Complete Current Stock List of Simmons *Engineered-Rebuilt* Machine Tools

ENGINEERED Machine Tools REBUILDING

SIMMONS MACHINE TOOL CORPORATION

MAIN OFFICE AND PLANT: 1759 N. BROADWAY, ALBANY 1, N. Y. NEW YORK OFFICE: 50 EAST 42ND STREET

UNUSUAL VALUES

Blueprint machines, printer-washer-dryer
Rivett Ball Brg. Precision Screw-Machine
Simmons No. 1A Micro Milling Machine
Drills, high speed single & multiple spindle
Drills, 21" Royersford Bk Grd. Pr. Feed, New
Drills, sensitive, 3 and 4 Spindles
Drill, #25 Foot-Burt motor driven
Drills—New—18" Royal Motor driven (10)
Gear Cutter, Brown & Sharpe #3—26
Gear Cutter, Gould & Eberhardt 42"
Grinder, Webster and Perks #1-¾ motor drive
22" Buffalo Pr. Fd. Motor Drive, New
16"x8' Hendey Lathe, Quick Change Gear
Magic Chucks #1-2 & 3 and Collets
Pipe Machine, 3" Outer motor drive
Planer, 24"x24"x8' Pease motor drive
Punch & Shear, two ½" & ⅝" capacity
Shaper, 24" Gould & Eberhardt
Turret Lathe, 2" Acme & Warner & Swasey
Welders—Arc & Spot in Stock—New

Outfit: about 27 fine machine tools, drills, lathe, and 5 milling machines, plain and Uni. Tell us definitely what you want as our list is incomplete and only partial.

The above list is only a fraction of our stock which changes almost daily, therefore, tell us definitely what you want since we are adding considerable number of machines to our stock which are too many to list. What we have today may be sold tomorrow, so a list is really not dependable.

THE OSBORNE & SEXTON MACHINERY CO.
COLUMBUS, OHIO

LATE TYPE TOOLS

#2MH Cinci. Univ. Miller 1944
#3SP Van Norman Miller 1942
Nos. 2, 3, 4, Cinci. Vert. Miller '42, '45
#2, 3, 4 & 5 W. & S. Univ. &
#3 J. & L. Univ. Turret Lathes
#712 Fellows Gear Generator, 1942
36H & 48H G.&E. Gear Hobbers
30" x 15' centers Amer. Super Pro. Lathe
18" raised to 24½" x 192" centers, BB
Model Monarch, Carr. P. R. T., '42

BENNETT MACHINERY CO.
30 Church St. N. Y. 7, N. Y.

NEW— SURPLUS

0"-1" Micrometers, 1/10,000, Reed, $3.50 ea.

1"-2" Micrometers, 1/10,000, Reed, $4.00 ea.

3"-4" Micrometers, Central Tool, $6 ea.

4"-5" Micrometers, Reed, $6.00 ea.

5"-6" Micrometers, Reed, $6.00 ea.

Gages, 2¾" thickness, range .004 to .025, 22 leaves, Goodell-Pratt, $.50 ea.

Surface Gages 9" Adj., Millers Falls $2.75 ea.

Universal Bevel Protractors with 7" & 9" Blades, Starrett, $17.50 ea.

Starrett Steel Beam Trammels #251B, with 14½" Beam, $4.00 ea.

VICTOR MACHINERY EXCHANGE, Inc.

251 Centre St. New York 13, N. Y.
CANAL 6-5575

REYNOLDS MACHINERY SPECIALS!

#30 Fosdick Jig Borer
16 x 72 Norton Cylindrical Grinder, new
(2) #2K Kearney & Trecker Vertical Millers
(1) #4K Kearney & Trecker Vertical Miller with rotary table
#2MH Cincinnati Plain Miller, 1942
#72A3 Heald Internal Grinder, very special $500.
#0-8 Cincinnati Vertical Miller, $600

Many other special bargains in stock.

REYNOLDS Machinery Company

305 Eddy St. Providence, R. I.
Tel.: Gaspee 5187

IMMEDIATE SALE!

TOOL STEEL

TUNGSTEN HIGH SPEED (FLAT)

Pounds			Pounds		
208	¼" x 1¼"	N: 46-S-37, T4	38	1" x 1⅛"	N: 46-S-37, T4
175	¼" x 1½"	N: 46-S-37, T4	633	1" x 1¼"	N: 46-S-37, T4
104	¼" x 3"	N: 46-S-37, T4	329	1" x 1½"	N: 46-S-37, T11
194	⅜" x 7/8"	N: 46-S-37, T11	770	1" x 1¾"	N: 46-S-37, T4
629	⅜" x 1⅛"	N: 46-S-37, T4	672	1" x 2"	N: 46-S-37, T4
1296	⅜" x 1⅜"	N: 46-S-37, T4	3595	1" x 2½"	N: 46-S-37, T4
389	⅜" x 2"	N: 46-S-37, T4	426	1" x 2¾"	N: 46-S-37, T4
478	⅜" x 3"	N: 46-S-37, T4	425	1" x 3"	N: 46-S-37, T11
278	½" x 2"	N: 46-S-37, T11	5961	1" x 4"	N: 46-S-37, T11
241	½" x 2½"	N: 46-S-37, T4	612	1⅛" x 1⅝"	N: 46-S-47, T4
102	½" x 7/8"	N: 46-S-37, T11	1114	1⅛" x 2 13/16"	N: 46-S-37, T4
5093	½" x 1⅛"	N: 46-S-37, T4	423	1⅛" x 1½"	N: 46-S-37, T4
242	½" x 2½"	N: 46-S-37, T4	1037	1⅛" x 1⅝"	N: 46-S-37, T4
171	½" x 2¾"	N: 46-S-37, T4	695	1⅛" x 1 15/16"	N: 46-S-37, T4
986	½" x 3"	N: 46-S-37, T4	1007	1⅛" x 2"	N: 46-S-37, T4
86	⅝" x 1"	N: 46-S-37, T4	1323	1⅛" x 2¼"	N: 46-S-37, T4
1005	⅝" x 1¼"	N: 46-S-37, T4	324	1⅛" x 2½"	N: 46-S-37, T4
2046	⅝" x 1½"	N: 46-S-37, T4	112	1⅛" x 2⅝"	N: 46-S-37, T4
151	⅝" x 2"	N: 46-S-37, T4	557	1⅛" x 3½"	N: 46-S-37, T11
731	⅝" x 2¾"	N: 46-S-37, T11	639	1⅛" x 2½"	N: 46-S-37, T4
518	⅝" x 1¾"	N: 46-S-37, T4	841	1⅛" x 2 13/16"	N: 46-S-37, T4
623	⅝" x 1½"	N: 46-S-37, T4	322	1⅛" x 3"	N: 46-S-37, T4
156	⅝" x 1⅝"	N: 46-S-37, T4	518	1⅛" x 3⅛"	N: 46-S-37, T4
273	⅝" x 2¼"	N: 46-S-37, T11	130	1¼" x 2½"	N: 46-S-37, T4
1028	⅝" x 2½"	N: 46-S-37, T4	563	1⅛" x 2⅝"	N: 46-S-37, T4
900	⅝" x 2½"	N: 46-S-37, T4	34	1¼" x 2½"	N: 46-S-37, T4
88	⅝" x 2¾"	N: 46-S-37, T4	1206	1¼" x 2¾"	N: 46-S-37, T11
1218	⅝" x 3"	N: 46-S-37, T4	236	2" x 3"	N: 46-S-37, T4
250	⅝" x 3⅛"	N: 46-S-37, T4	3022	2" x 4"	N: 46-S-37, T4
31	1⅛" x 1½"	N: 46-S-37, T4	2359	3⅛" x 5"	N: 46-S-37, T4
2657	1" x 1¼"	N: 46-S-37, T4	109	4" x 5"	N: 46-S-37, T4

TUNGSTEN HIGH SPEED (SQUARE)

Pounds			Pounds		
368	¼" Sq.	N: 46-S-37, T4	3059	1¼" Sq.	N: 46-S-37, T4
415	5/16" Sq.	N: 46-S-37, T4	7455	1½" Sq.	N: 46-S-37, T4
531	⅜" Sq.	N: 46-S-37, T4	3574	1¾" Sq.	N: 46-S-37, T4
430	½" Sq.	N: 46-S-37, T4	4780	2" Sq.	N: 46-S-37, T4
135	⅝" Sq.	N: 46-S-37, T4	2061	2¼" Sq.	N: 46-S-37, T4
292	¾" Sq.	N: 46-S-37, T4	1164	2½" Sq.	N: 46-S-37, T4
1164	⅞" Sq.	N: 46-S-37, T11	2669	3" Sq.	N: 46-S-37, T4
8255	1" Sq.	N: 46-S-37, T4			

TUNGSTEN HIGH SPEED (ROUND)

Pounds			Pounds		
74	5/16" Rd.	N: 46-S-37, T4	1122	4" Rd.	N: 46-S-37, T11
349	⅜" Rd.	N: 46-S-37, T11	2130	4½" Rd.	N: 46-S-37, T4
269	7/16" Rd.	N: 46-S-37, T11	1802	4½" Rd.	N: 46-S-37, T11
581	½" Rd.	N: 46-S-37, T11	1084	5" Rd.	N: 46-S-37, T4
624	1⅛" Rd.	N: 46-S-37, T11	284	5½" Rd.	N: 46-S-37, T2
410	2" Rd.	N: 46-S-37, T1	1202	5½" Rd.	N: 46-S-37, T4
846	2⅛" Rd.	N: 46-S-37, T4	5058	5½" Rd.	N: 46-S-37, T11
2826	2¼" Rd.	N: 46-S-37, T4	534	6" Rd.	N: 46-S-37, T4
577	2½" Rd.	N: 46-S-37, T4	3130	6" Rd.	N: 46-S-37, T11
5317	3¼" Rd.	N: 46-S-37, T4	1253	6½" Rd.	N: 46-S-37, T4
465	3½" Rd.	N: 46-S-37, T4	1823	6½" Rd.	N: 46-S-37, T11
1024	3½" Rd.	N: 46-S-37, T11	947	7" Rd.	N: 46-S-37, T4
619	4" Rd.	N: 46-S-37, T4			

GRAPHMO

Pounds			Pounds		
5420	10⅜"	Round Timken	696	1¾" x 2½"	Flat Timken

CARBON

Pounds			Pounds		
1659	1⅜" Rd.	46-S40 Class 3	2529	5½" Rd.	46-S-40 Class 4
1066	2¼" Rd.	46-S-40 Class 3			

GRAPH-TUNG

Pounds		Pounds	
820	8" Round Timken	2696	10" Round Timken
1719	9" Round Timken		

Subject to Prior Sale

THE COMMERCIAL SURPLUS SALES CO.

2401 FREDERICK AVE. PHONE: GILMOR 3665

BALTIMORE 23, MD.

QUALITY TOOLS

AUTOMATIC

18"x33" Fay with air operated tailstock. New 1942.

ENGINE LATHE

28"x72" centers American Pacemaker. Taper attachment, collets, 2 chucks, pan & pump. Built 1946.

BORING MILL

4¾" bar, No. 300 Giddings & Lewis, floor type Vertical travel 82", horizontal travel 132", feed of bar 40" Has outer support and bed plate.

PLANER

96"x48"x12' Liberty with 2 rail and 1 side head. Has power rapid traverse, forced feed lubrication and variable voltage drive with MG set.

BROACH

No. HP50 Lapointe hydraulic with extension broach support. 25 ton capacity, 72" stroke. Built in 1940.

SENSITIVE DRILL

24" Allen 3 spindle No. 3 type VCPF with power feeds and back gears. New 1942.

TAPER SPLINE HOBBER

Type T Barber Colman with long overarm with support at rear for long work. For splines or gears. New 1944.

CENTERLESS GRINDERS

Nos. 2 & 3 Cincinnati with Filmatic bearings, hydraulic profile truing. Built from 1940 to 1943.

CYLINDRICAL GRINDERS

6"x18" No. 10 Brown & Sharpe electric-hydraulic. Three have oscillating attachment.
New in 1941 and 1942.

SURFACE GRINDERS

6"x18" & 10"x24" Norton hydraulic. New 1942.

TURRET LATHES

Nos. 3, 4 & 1L Gisholt. Built from 1942 to 1944.

VERTICAL TURRET LATHE

36" Bullard, spiral geared, built 1942. Also 24", 36" & 42" New Era type.

PLAIN MILLERS

No. 3 High Speed & No. 4 Medium Speed Cincinnati dial type horizontal. New in 1942.

MANUFACTURING MILLERS

No. 2-24" Cincinnati automatic. Nos. 8-36, 4-36, 4-48, 5-48, 5-60 and 5-80 duplex Cincinnati Hydramatic. Built from 1942 through 1944.

VERTICAL MILLERS

Nos. 2M, 2, 3, 4 & 4 High Power Cincinnati Nos. 2H, 3H & 4H Kearney & Trecker. Built 1942 to 1944.

PRESS

1000 Ton No. 666 Toledo knuckle joint coining with 4½" stroke and Farval lubrication.

SEND FOR COMPLETE LIST

MILES MACHINERY CO.
SAGINAW, MICH.

MACHINE TOOLS

Specials
Pratt & Whitney No. 2A Jig Borer
Gorton Duplicators and Vert. Millers
Gorton No. 3% engraving machines
Milwaukee No. 2HL
B. & S. No. 2 Vert., Swivel Head
Doall Surface Grinder with Selectron
Marvel No. 6A Hacksaw, M. D., Auto.
Injection Moulders, Hydraulic Presses
Chicago No. 410D Press Brake, 10', 10 gauge cap.

BORING MILLS

#0 Giddings & Lewis arr., M.D.
2½" Cleveland arr. M.D.
2½", 4" Binsee
Niles-Bement-Pond 4" duplex
Universal 3"
66" Niles; 54" Colburn, M.D. 2 hds.

TURRET LATHES

Bullard New Era 24", 42", Vert. M.D.
W. & S. Nos. 3, 4, 5 Grd. Hd., Preselector
Gisholt No. 1L, 2L Univ. M.D.
Foster Nos. 4, 5, 6, 1B, 3B M.D. Univ.
J. & L. 2¼"x24", 3¼"x36", #3, Dial Type
Acme #2 M.D.

GRINDERS

#25 Gallmeyer & Livingston Surface
#25A Heald, M.D. like new, Rotary Surf.
No. 2 Cincinnati Centerless M.D.
B. & S. No. 2, 2B Surface, M.D.
P. & W. 14", B.B., Vert. Surface
Blanchard 30", M.D.; Modern 12x48" M.D.
Norton Hydraulic 12x18", M.D.
Heald Nos. 72A8 Gagematic
Norton 50"x25', M.D. Roll Grinder
Landis Type A 6x20" Hydraulic, M.D.
No. 55, 60, 65 Heald int., M.D.
12" Heald Rotary, Arter 12" M.D.
B. & S. No. 10 11 Cyl.; 1, 3 Univ.
Norton 6x18" Hyd. Surface, M.D.

LATHES

16"x8', South Bend, M.D. Taper, Late
Monarch Hendey 12x30, 10x20 G.H. Late
26x12' Boye & Emmes 2 step cone D.B.G.
14"x6' Hendey, Taper, Collets
9" LeBlond, P&W Auto.
36x30' Putnam M.D., 36x22', 42x16
32"x35' Wickes, M.D.
20"x30' Boye & Emmes Grd. Hd.,

AUTOMATICS

Cleveland Model A ⅞", 1¼", 2"; B 1", 2"
⅞" Cone 4 spindle, Gridley
B & S #0, No. 2 Hand Screw

New In Stock
Power Shears—52" & 72"
Spot & Arc Welders
5, 9, 14, 18 & 30 ton OBI Power Presses
Ammco 7", Shape Rite 8" Shapers
H.S. Vertical Milling Heads
Drill Presses, Foot Presses
Kalamazoo Metal Band Saws
No. 1½ Abrasive Surface Grinder
6x6" Racine Hacksaw; #8 Marvel
20 ton Northern Hydraulic Presses

RADIALS

6' Cincinnati-Bickford
4' Fosdick 13" col., 5' Carlton, 19" col.
4', 5' 6' American Triple Purpose

MILLING MACHINES

Cincinnati No. 1/18 Mfg. late.
Cleveland Vert. No. 1 M.D.; #1 Univ.
#12, #22L Van Norman Univ.
#2B K & T Univ.; No. 2A B & S Univ.
#2HL Milwaukee, M.D. late
No. 6S Cincinnati, S.P.D. rapid trav.
Nos. 0Y, 2, 3, 4, 5 B & S Plain & Univ.
Hall Planetary Model D Thread Miller
Becker Nos. 3, AB, 5, 6, Vert.
Nos. 2, 3, 4 Cincinnati Vert.
P. & W. No. 12, 30" Profiler, M.D.
B. & S. No. 1, 3, Vert.
B & S #12 Elec. Prod. late type

MISCELLANEOUS

Cincinnati 20" shaper, like new.
Oliver No. 510 Drill Pointer
Buffalo #0 Angle Roll, M.D.
#20 Bliss OBI, #58-OB Gap Presses
Gorton 3Z, 1S, Pantographs
6" Vertical Shaper, P & W
Oster Pipe Machines, 4"
10x10 Peerless Universal Shaping Saw
#7, 72 Fellows Gear Shapers
#272 Niagara, Pexto 6' Power Shears
Burke & Nichols Millers, Pl. & Univ.
Delta Single & Multiple Drills
Niagara 8' Foot Power Shear

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In New, Used And Rebuilt Machine Tools

LATHES

1—Bridgeford 36" x 56', 15 speed, grd. hed., Eng. Lathe, M.D. AC elect. equip. power rap. trav. to carr., compound rest, 2 steady rests, sw. 38" over bed, 20" over carr., dist. betw. cens. 48', mtzd apron and taper attmt.

2—Reed-Prentice 14"x8', 8 speed, Model AA, slide, gr. hed. Tool Room Lathes, sw. over bed 14½", dist. betw. cens. 31", timk. bear., taper attmt, motor in base.

1—American 20"x8' Eng. Lathe, QCG, dist. betw. cens. 48", sw. over bed. 22½" hole thru spindle 1-11/16", M.D.

1—Oliver 16"x7' Eng. Lathe, M.D., QCG, sw. over bed 17½", dist. betw. cens. 39", hole thru spindle 1-5/16".

HORIZ. BORING MILLS

1—Giddings & Lewis #0 Hor. Boring mill, knee type, diam of bar 3½", 16 spin. speeds, max. dist. top of tbl. to cen. of spin. 28", cross feed 30", tbl. wkg. surf. 23¾"x45¾", dist. from spin. nose to outboard sup. 84", approx. wght. 9500 lbs.

1—Uni. #3-A Hor. Bor. Mill, diam. bar 3", No. 5 taper, rapid mill. feeds, size of tbl. 24"x48", cross feed to tbl. 36", dist. to outer sup. 60", vert. feed to hed. 20", wght. approx. 11,200 lbs. M.D.

SHAPERS

1—Hendey 20" Crank Shaper, stroke 20¾", strokes per min. 8-115, horiz. trav. 24½", vert. trav. 15".

1—Stockbridge 24"-28" Crank Shaper, auto. cross feed 30", vert. adj. 15".

HAMMERS

1—Standard Mchy. No. 5, 500 lb. Automatic.

1—United 3000 lb. board drop type

MILLERS

2—Cin. #3 Hor. Dial Type Miller, latest type, tbl. wkg. surf. 58¾"x15", long. Feed. 34", cross 12", vert. 20", spindle speeds 18-450 RPM.

1—Cin. No. 2MH Pl. Hor. (Late Type) Miller, 1200 RPM, tbl. wkg. surf. 40"x10½", long-range 28", cross 10", vert. 19".

1—Brown & Sharpe No. 3B sing. overarm, motor in base Stand. Pl. Miller, tbl. wkg. surf. 60¼"x11", 16 spin. speeds, range power feeds: long. 31", cross 12", vert. 19½".

1—Cin. #3 Vert. Dial Type Miller, latest type, tbl. wkg. surf. 62½"x15¼", long. feed 34", cross 10", vert. 16", spindle speeds 18-450 RPM.

TURRET LATHES

1—W. & S. No. 1A Univ. Hollow Hex. Turret Lathe, hole thru spin. 1½", 12 spin. speeds from 20-458 RPM, chuck capac. round stock 2½", length turned max. 35", sw. over carriage 13½", over covers 16¾", complete with bar and chuck. equip.

1—Bardons & Oliver #3 Univ. Turret Lathe, hole thru. spin. 1⅞", sw. over bed 15¾", 12 spin. spds., bar feed, very latest type.

1—W. & S. No. 3 Univ. Turret Lathe, spin. speeds 67-1480 RPM, bar equip., hole thru spin. 1-27/32" sw over bed 16⅜, very latest type.

1—Simmons #2 Micro speed DBG Turret Lathe, motor in base, sw. over bed 14", over cross slide 6", hole in plunger 1-9/32", hole thru spin. 1½", spin. speeds 20", range: 44-750 RPM, max. dist. end of spin. to turret face 18".

VERTICAL BORING MILLS

NEW ERA TYPE
1—Bullard 24, capac. 26" diam. 20" high, 28' under turret feed, 2 jaw chuck, coolant, M.D., weight approx. 9,000 lbs.

2—Bullard 36" "Spiral Drive", face of turret to tbl. 34", clear under cross rail 27½", vert. trav. of turret 26⅝", clear under S.H. slide 18", 3 and 4 jaw chuck, approx. wght. 17,500 lbs.

1—Bullard 42" "New Era Type" Vert. Bor. Mill, with side hed. coolant crowning attmt., 4 jaw type chuck, capac. 44" diam., 33" cross rail, 43½" under turret face, M.D.

1—Niles 53" Vert. Bor. Mill, Heavy Duty, M.D. 2 heds. on cross rail, 44½" clear under cross rail, tbl 52" diam., vert. travers tool slides 24", arrange for M.D., power rap. trav. to heds., wght approx. 22,540 lbs.

PLANERS

1—Cin 78"x56"x22', Planer, M.D. rap. trav., 2 hds. on cross rail, 2 side heds., "Intermediate herringbone gear."

1—Woodward-Powell 48"x44"x14', 2 heds. on cr. rail, 2 side heds., reversible M.D., motor control complete, generator set.

1—Cin. 60" Planer, 72"x60"x32', 2 heds. on cr. rail, 2 side heds., tbl. wkg. surf., width 60", 31' long. thickness of box tbl. 9", AC, M.D.

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Cincinnati Vertical Mill #3, Rotary Table
Cincinnati Plain Mills, #4, #5
Cincinnati Universal Mill—H.S.—#3
Reed Prentice 3VG Vertical Mill with Detroit Duplicator

LATHES

Hendy 14x54 Tool Room Lathe—T.A.
Reed-Prentice 16"x30" Lathe
Niles 48"x32' BG Lathe
Niles 60"x20' BG Lathe
Niles 30"x11' BG H.D. Lathe
Warner & Swasey #3, #4 Plain and Universal
Warner & Swasey #1A, #2A for selector head, bar & chucking
Gisholt #5 Universal
Bardons & Oliver #5 Turret Lathe

BORING MILLS

Bullard 24" and 36" Vertical
King 62" Vertical

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Landis 6x18 Plain
Landis 16x36 Universal
Norton 12x36 Universal
Cincinnati 14x48 Universal
Cincinnati Centerless #3
Heald 72A3 Internal—Red Head
Rivett #104 Internal
Brown & Sharpe #1 Universal
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Blount Model F 20" Wet

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Grob W.S. 36" Band Saws
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#0 B & S Wire Feed Screw Machines, M.D.
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LATHE, 38"x18' Putnam, Grd. Hd. Q.C.G., T.A.
LATHE, 42"x50' Putnam, Grd. Hd.
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MILLER, Plain No. 3 Milwaukee, S.P.D.
MILLER, Plain, Nos. 3S, 4 & 5 Cincinnati.
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PLANER, Openside, 38"x36"x12' Cleveland
PLANER, O.S. 72"x72"x23' Cleveland
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The Treasury Department acknowledges with appreciation the publication of this message by

American Machinist

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and The Advertising Council.

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OVER 1200 YEARS OF EXPERIENCE

BUILT INTO HENDEY LATHES AND SHAPERS

Men with a pride in their craftsmanship and a devotion to their work are bound to build better machines. The group above, gathered to honor their old associate, Mr. W. P. Norton, inventor of the Quick Change Gear Box, has a combined service record with Hendey that adds up to more than 1200 years. They draw unsparingly on this priceless experience in developing and building the constantly improving Hendey lathes and shapers. They are your assurance that machines built by Hendey will always meet the highest standards of accuracy and performance.

Particularly interesting is the lathe on Mr. Norton's left. It is the original machine on which the Quick Change Gear Box was installed. In 1892 this lathe won a Gold Medal at the Chicago Exposition. Today it is still going strong. The modern lathe just behind Mr. Ayr, President of Hendey, is a 1947 model Hendey Toolroom Lathe, functionally designed for the vastly advanced production needs of today. You'll see them together again in the Hendey booth at the Machine Tool Show.

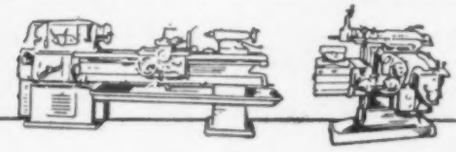
The Hendey Machine Company

Hendey

Main Office and Plant — Torrington, Connecticut

Offices — N. Y., Chicago, Boston, Detroit, Rochester, Los Angeles, San Francisco

Representatives in — Philadelphia, Cleveland, Pittsburgh



TOOL ROOM LATHES
12" - 14" - 16" - 18" - 20"

SHAPERS
12" - 16" - 20"

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Only the SIDE of a V-Belt TOUCHES the Pulley

Diagram of V-Belt in Sheave Groove

The *SIDE* Does ALL the Gripping--
----Naturally it *GETS the WEAR!*

Every ounce of load a V-Belt *carries* must first be picked up by the sides of the belt. Clearly so, because *only* the *sides* touch the pulley! The sides do all the GRIPPING—they get all the WEAR against the sheave-groove wall. The sides pick up the load. They transmit that load to the belt as a whole. And then, once more, the sides—and the sides alone—grip the driven pulley and deliver the power to it.

No wonder you have always noticed that the sidewall of the *ordinary* belt is the part that *WEARS OUT FIRST.*

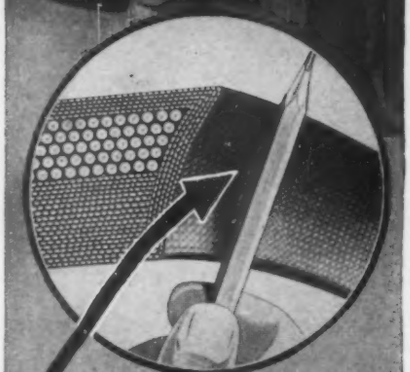
Now See How the Patented CONCAVE SIDE
★ *SAVES Sidewall Wear and Lengthens Belt Life!*

Naturally, since the sidewall is the part that wears out first, anything that prolongs the life of the sidewall will lengthen the life of the belt.

The simple diagrams on the right show exactly why the ordinary, straight-sided V-Belt gets excessive wear along the *middle* of the sides. They show also why the Patented Concave Side greatly reduces sidewall wear in Gates Vulco Ropes. That is the simple reason why your Gates Vulco Ropes are giving you so much longer service than any straight-sided V-Belt can possibly give.

★Longer Sidewall Wear is MORE IMPORTANT NOW Than Ever Before!

Now that Gates *SPECIALIZED* Research has resulted in Super V-Belts capable of carrying much heavier loads—up to 40% *higher horsepower ratings* in some cases—the sidewall of the belt is called upon to do even more work in transmitting these heavier loads to the pulley. Naturally, with heavier loading on the sidewall, the life-prolonging Concave Side is more important NOW than ever before!



The CONCAVE SIDE is a GATES PATENT

Straight Sided V-Belt

Fig. 1

How Straight Sided V-Belt Bulges When Bending Around Its Pulley

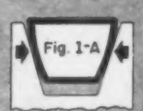


Fig. 1-A

You can actually feel the bulging of a straight-sided V-Belt by holding the sides between your finger and thumb and then bending the belt. Naturally, this bulging produces excessive wear along the middle of the sidewall as indicated by arrows.

Gates V-Belt with Patented Concave Sidewall

Fig. 2

Showing How Concave Side of Gates V-Belt Straightens to Make Perfect Fit in Sheave Groove When Belt Is Bending Over Pulley.

Fig. 2-A

No bulging against the sides of the sheave groove means that sidewall wear is evenly distributed over the full width of the sidewall—and that means much longer life for the belt!

THE GATES RUBBER COMPANY, DENVER, U. S. A. "World's Largest Maker of V-Belts"

GATES VULCO ROPE DRIVES

Gates

THE MARK OF SPECIALIZED RESEARCH

Engineering Offices and Jobber Stocks **IN ALL INDUSTRIAL CENTERS** of the U. S. and 71 Foreign Countries

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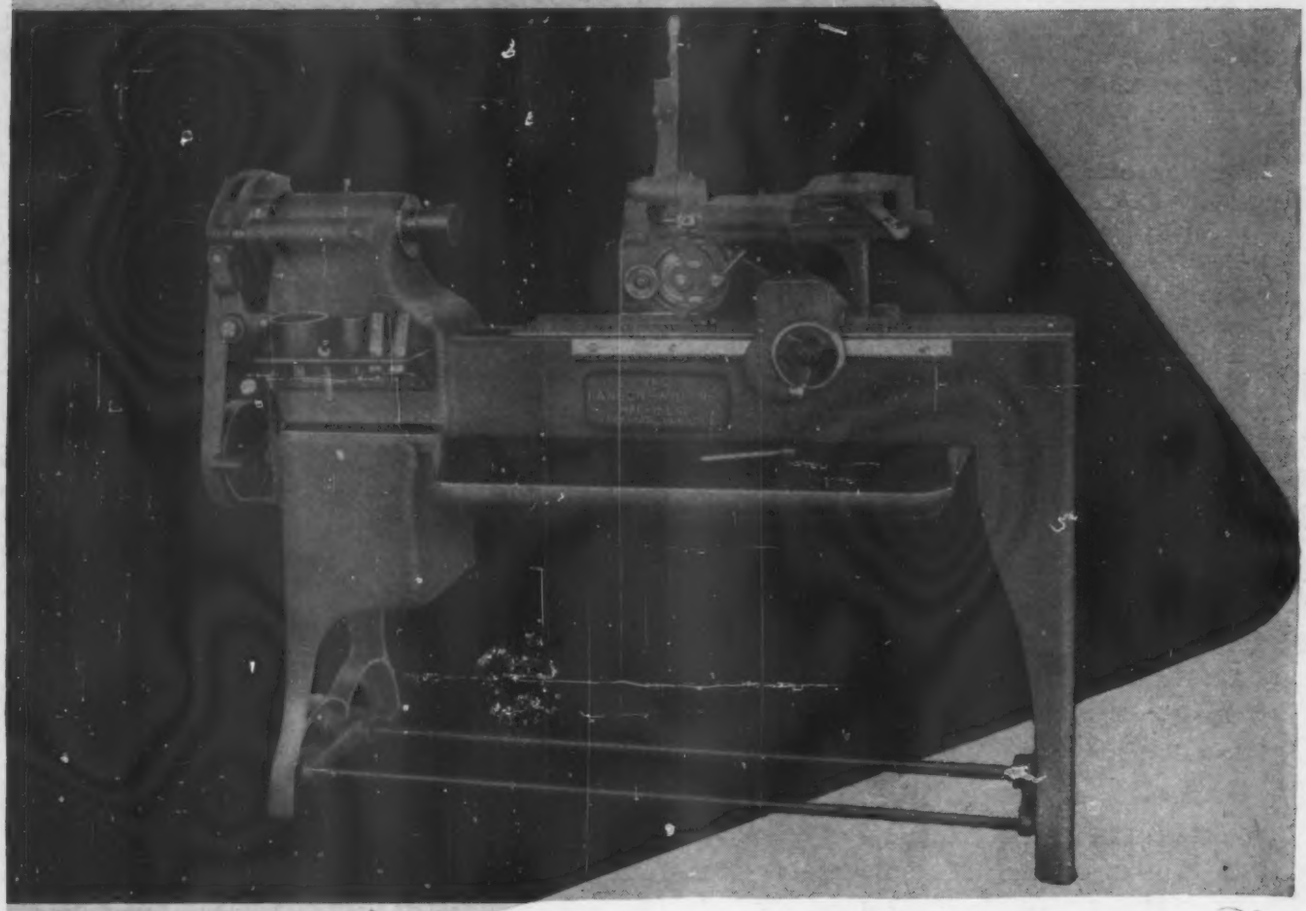
CORRECT CENTERING...
is an IMPORTANT OPERATION



The Hanson-Whitney Rapid Precision Centering Machine has solved the problem of accurate, rapid centering of bright rolled stock, or parts produced on bar machines where centers are required for a succeeding operation. The correct principle of rotating work in center-rest is utilized. Center is drilled and shaved in separate operations. Center-rest is quick-acting roller type, instantly adjustable for diameter through observation dial. The unique, quick-acting work chucks, in conjunction with foot-treadle operation, enable varying diameters to be handled with the utmost speed and accuracy.

Write for descriptive folder today.

Hanson Whitney

MACHINE COMPANY
HARTFORD • CONNECTICUT

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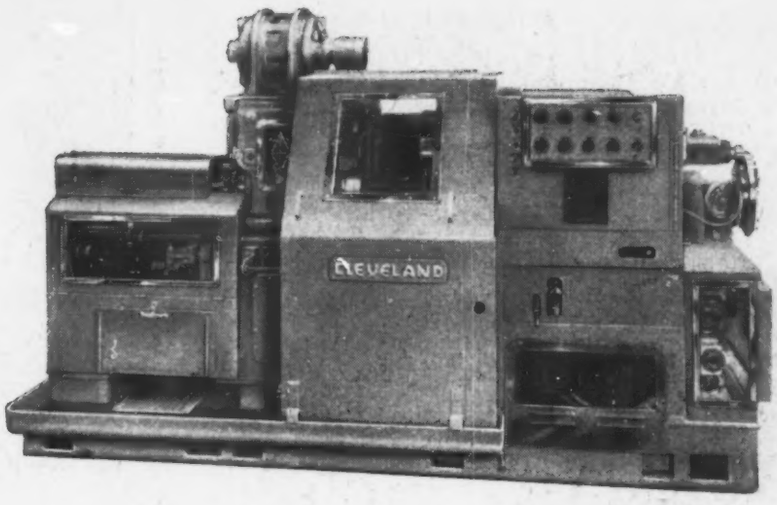
AT

BOOTH 510

MACHINE TOOL SHOW

CHICAGO SEPT. 17-26

Dodge Chicago Plant



The New Dialmatic CLEVELAND

Model AB 2½" Single Spindle Automatic with Infinitely Variable Tool Feed Drive

DIALMATIC TOOL FEED

Infinitely variable feed settings (forward and return) are pre-set on control panel for each of five turret stations. Feed rate is adjustable while any tool is cutting.

CONVERTIBLE

This new Cleveland is the *only* single spindle automatic that is rapidly convertible from a bar type machine to a chucking machine.

ANTI-FRICTION Spindle Head

Timken spindle bearings. Four automatic spindle speeds (forward or reverse). 128 spindle speed selections ranging from 24 r.p.m. to 1800 r.p.m

CROSS SLIDES

Long front and rear cross forming slides provide a wide tooling area. Smooth operation under heavy forming cuts.

TURRET-INDEXED BY GENEVA MOVEMENT

Four-slot Geneva indexing mechanism provides smooth, rapid, shock-free indexing.

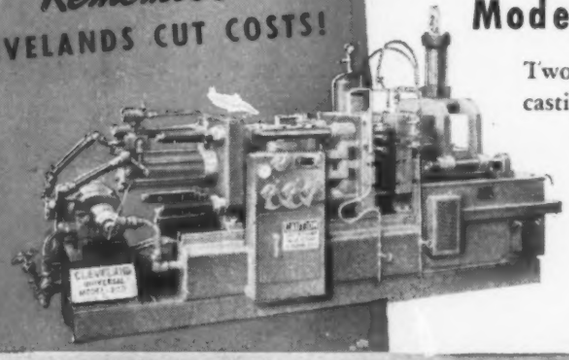
Production Men:

Three versatile Cleveland Automatics and two Cleveland Die Casting Machines will be in full operation at the Machine Tool Show, Booth 510.

Take this opportunity to inspect Cleveland design—at close range—for the latest advancements in automatic screw machine engineering and high-pressure hydraulic die casting machinery. Write now for bulletins.

Remember

CLEVELANDS CUT COSTS!



2 CLEVELAND Die Casting Machines

Model 400 and the *new* Model 200

Two tremendously powerful high-pressure hydraulic die casting machines capable of fast, accurate, dependable casting production.

High pressures with strength to resist stretch, distortion or breakage. Large die area—easy access to dies. Sure-fire shot mechanism. Rapid, positive core pulling and ejection. Simple, full automatic control.

THE CLEVELAND AUTOMATIC MACHINE COMPANY

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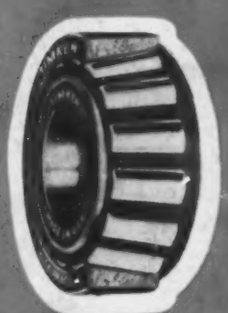
WHAT ANTI-FRICTION BEARING PREDOMINATES IN MODERN MACHINE TOOLS

?

Check the Exhibits at the Machine Tool Show!

When you visit the exhibits at the Chicago show, note how many of the machines shown are equipped with Timken Tapered Roller Bearings — on spindles, in headstocks, gear boxes, feed mechanisms and at other important positions. This will definitely settle in your mind what bearing is preferred for modern heavy duty machine tools. You'll find that a substantial majority of all anti-friction bearings used in these machine tools are Timken Bearings. It will pay you to have them in the new machines you buy. The Timken Roller Bearing Company, Canton 6, Ohio.



Be Sure And Visit
The
TIMKEN EXHIBITS
Spaces 317-D and 317-H

See How Timken Spindle Bearings Are Electronically Tested For Precision

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◎ AND THRUST →◎← LOADS OR ANY COMBINATION